GOVERNMENT OF MADRAS

RURAL PROBLEMS IN MADRAS

MONOGRAPH

BY

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No	ANANTAPUR	No	CHITTOOR	No	GUNTUR	No	MALABAR	No	TANJORE
1	ANANTAPUR	1	CHANDRAGIRI	1	BAPATLA	1	CALICUT	1	ARANTANGI
2	DHARMAVARAM	2	CHITTOOR	2	GUNTUR	2	CHIRAKKAL	2	KUMBAKONAM
3	GOOTY	3	KALAHASTI	3	NARASARAOPET	3	ERNAD	3	MANNARGUDI
4	HINDUPUR	4	KANGUNDI	4	ONGOLE	4	KOTTAYAM	4	MAYAVARAM
5	KADIRI	5	MADANAPALLE	5	PALNAD	5	KURUMBRANAD	5	NANNILAM
6	KALYANDRUG	6	PALMANER	6	REPALLE	6	PALGHAT	6	NEGAPATAM
7	MADAKASIRA	7	PUNGANUR	7	SATTENAPALLE	7	PONNANI	7	PAPANASAM
8	PENUKONDA	8	PUTTUR	8	TENALI	8	WALLUVANAD	8	PATTUKKOTTAI
9	TADPATRI	9	TIRUTTANI	9	VINUKONDA	9	WYNAD	9	SHIYALI
		10	VAYALPAD					10	TANJORE
								11	TIRUTTURAIPPUNDI

No	ARCOT NORTH	No	COIMBATORE	No	KANARA SOUTH	No	NELLORE	No	TINNEVELLY
1	ARKONAM	1	AVANASHI	1	COONDAPOOR	1	ATMAKUR	1	AMBASAMUDRAM
2	ARNI	2	BHAVANI	2	KARKAL	2	DARSI	2	KOVILPATTI
3	CHENGAM	3	COIMBATORE	3	KASARAGOD	3	GUDUR	3	NANGUNERI
4	CHEYYAR	4	DHARAPURAM	4	MANGALORE	4	KANDUKUR	4	SANKARANAYINARKOIL
5	GUDIYATTAM	5	ERODE	5	PUTTUR	5	KANIGIRI	5	SRIVAIKUNTAM
6	POLUR	6	GOBICHETTIPALAIYAM	6	UDIPI	6	KAVALI	6	TENKASI
7	TIRUPPATTUR	7	KOLLEGAL			7	KOVUR	7	TINNEVELLY
8	TIRUVANNAMALAI	8	PALLADAM			8	NELLORE	8	TIRUCHENDUR
9	VELLORE	9	POLLACHI			9	PODILI		
10	WALAJAPET	10	UDAMALPET			10	RAPUR		
11	WANDIWASH					11	SULURPET		
						12	UDAYAGIRI		
						13	VENKATAGIRI		

No	ARCOT SOUTH	No	CUDDAPAH	No	KISTNA	No	NILGIRIS	No	TRICHINOPOLY
1	CHIDAMBARAM	1	BADVEL	1	BANDAR	1	COONOOR	1	KARUR
2	CUDDALORE	2	CUDDAPAH	2	BEZWADA	2	GUDALUR	2	KULITTALAI
3	GINGEE	3	JAMMALAMADUGU	3	DIVI	3	OOTACAMUND	3	LALGUDI
4	KALLAKKURICHCHI	4	PRODDATUR	4	GANNAVARAM			4	MUSIRI
5	TINDIVANAM	5	PULIVENDLA	5	GUDIVADA			5	PERAMBALUR
6	TIRUKKOYILUR	6	RAJAMPET	6	KAIKALUR			6	TRICHINOPOLY
7	VILLUPURAM	7	RAYACHOTI	7	NANDIGAMA			7	UDAIYARPALAIYAM
8	VRIDDHACHALAM	8	SIDDHAVATTAM	8	NUZVID				
				9	TIRUVURU				

No	BELLARY	No	GODAVARI EAST	No	KURNOOL	No	RAMNAD	No	VIZAGAPATAM
1	ADONI	1	AMALAPURAM	1	CUMBUM	1	ARUPPUKKOTTAI	1	ANAKAPALLE
2	ALUR	2	BHADRACHALAM	2	DHONE	2	MUDUKULATTUR	2	BIMLIPATAM
3	BELLARY	3	CHODAVARAM	3	KOILKUNTLA	3	PARAMAGUDI	3	BOBBILI
4	HADAGALLI	4	COCANADA	4	KURNOOL	4	RAMNAD	4	CHICACOLE
5	HARPANAHALLI	5	ELLAVARAM	5	MARKAPUR	5	SATTUR	5	CHIPURUPALLI
6	HOSPET	6	NUGUR	6	NANDIKOTKUR	6	SIVAGANGA	6	GOLUGONDA
7	KUDLIGI	7	PEDDAPURAM	7	NANDYAL	7	SRIVILLIPUTTUR	7	GUDEM
8	RAYADRUG	8	PITHAPURAM	8	PATTIKONDA	8	TIRUPPATTUR	8	ICHAPUR
9	SIRUGUPPA	9	RAJAHMUNDRY	9	SIRVEL	9	TIRUVADANAI	9	PALKONDA
		10	RAMACHANDRAPURAM					10	PATAPATNAM
		11	RAZOLU					11	PARVATIPUR
		12	TUNI					12	SALUR

No	CHINGLEPUT	No	GODAVARI WEST	No	MADURA	No	SALEM	No	VIZAGAPATAM (contd.)
1	CHINGLEPUT	1	BHIMAVARAM	1	DINDIGUL	1	ATTUR	13	SARVASIDHI
2	CONJEEVERAM	2	CHINTALAPUDI	2	KODAIKANAL	2	DHARMAPURI	14	SOMPETA
3	MADURANTAKAM	3	ELLORE	3	MADURA	3	HARUR	15	SRUNGAVARAPUKOTA
4	PONNERI	4	KOVVURU	4	MELUR	4	HOSUR	16	TEKKALI
5	SAIDAPET	5	NARSAPUR	5	NILAKKOTTAI	5	KRISHNAGIRI	17	VIRAVILLI
6	SRIPERUMBUDUR	6	POLAVARAM	6	PALNI	6	NAMAKKAL	18	VIZAGAPATAM
7	TIRUVALLUR	7	TADEPALLIGUDEM	7	PERIYAKULAM	7	OMALUR	19	VIZIANAGRAM
		8	TANUKU	8	TIRUMANGALAM	8	RASIPUR		
						9	SALEM		
						10	TIRUCHENGODU		

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INTRODUCTION

BY

SIR S. V. RAMAMURTY, K.C.I.E., I.C.S.

The object of this monograph is to survey the facts of rural life in the Province of Madras. In 1939, a Conference on Rural Life in Europe was arranged to be held under the auspices of the League of Nations and several monographs were prepared dealing with rural life in European countries. The preparation of this monograph dealing with all aspects of rural life in Madras was taken up by me as Adviser to the Governor of Madras a year ago. Sir Manilal Nanavati, President of the Indian Society of Agricultural Economics, Bombay, who suggested to me its preparation gave me a printed synopsis of what its contents might be. The work has been done by Mr. S. Y. Krishnaswami, I.C.S., Secretary to the Government of Madras. He deserves to be congratulated on the care and interest with which he has prepared the monograph.

Rural life in India is more nearly the whole life in India than it is in Europe. Some 80 per cent of the people of India live in villages. Their economy is the foundation of India's economy. If, as we hope, we build further storeys of economic life, the strength and stability of rural economy has to be conserved and improved.

Indian economy has to be viewed at five levels—cottage economy, rurban economy, regional economy, national economy and international economy. Primarily, cottage economy is physical, rurban economy is social, regional economy is economic, national economy is political and international economy is human. Rural economy is at the very base of Indian life. While it supports the rest of the economy, it is also affected by it. During the last fifty years of the impacts of international life on India, the cereals produced in villages have fallen from an average of 2,400 calories per head of the population to less than 1,600 calories. If rural life is to be strengthened, there is need to review international relations. The Interim Government of India have been acting with vigour to establish for India the place in the Councils of the world that is needed by her and is due to her.

As is pointed out in the monograph, an area of 7 million acres of cultivated land has passed over from food crops to

commercial crops in recent decades. This has been the result of a colonial economy in which commerce is the central factor. This has led to food production falling below the minimum nutritional standards. There is need to re-emphasize that the first lien on the land and water of the Province as indeed of all India is to provide food for the people, then work for them and last only, trade. An economy in which the welfare of the people is conserved and wealth circulates in adequate measure is needed. This requires a policy of self-sufficiency in regard to essential articles, such as food and clothing and certain basic materials for industry, such as steel and a policy of good neighbourliness in regard to other articles, nations giving and taking them according to their capacities and needs. In the bounds of a national economy there is need to build a regional economy so that all areas in the country may be given an equal opportunity for development. In industry, Madras is the most backward of Provinces. Within the Province too, there are disparities in development of resources. If there is to be food and work for all, resources everywhere should be developed.

There then remain cottage and rurban economies. The monograph shows that agriculture in the Province needs growth both in quality and quantity. The technique of agriculture is receiving the benefits of science but not yet to an adequate degree. Much research has been done but economic and psychological obstacles stand in the way of its results being adopted by the cultivator. Industry at the top being sparse, there is an undue pressure on land. Agriculture has more men than it needs as men have less industry than they need. With the large agricultural resources which the Sun gives, with an agriculture in which every field is protected at least by a well, with a cottage industry enriched by science, a stable economy may be built of agriculture and industry on a 60 : 40 basis. Fifty years ago, this ratio was 70 : 30. At present it is 80 : 20. This worsening of the balance must be arrested, if India is to raise her standard of living.

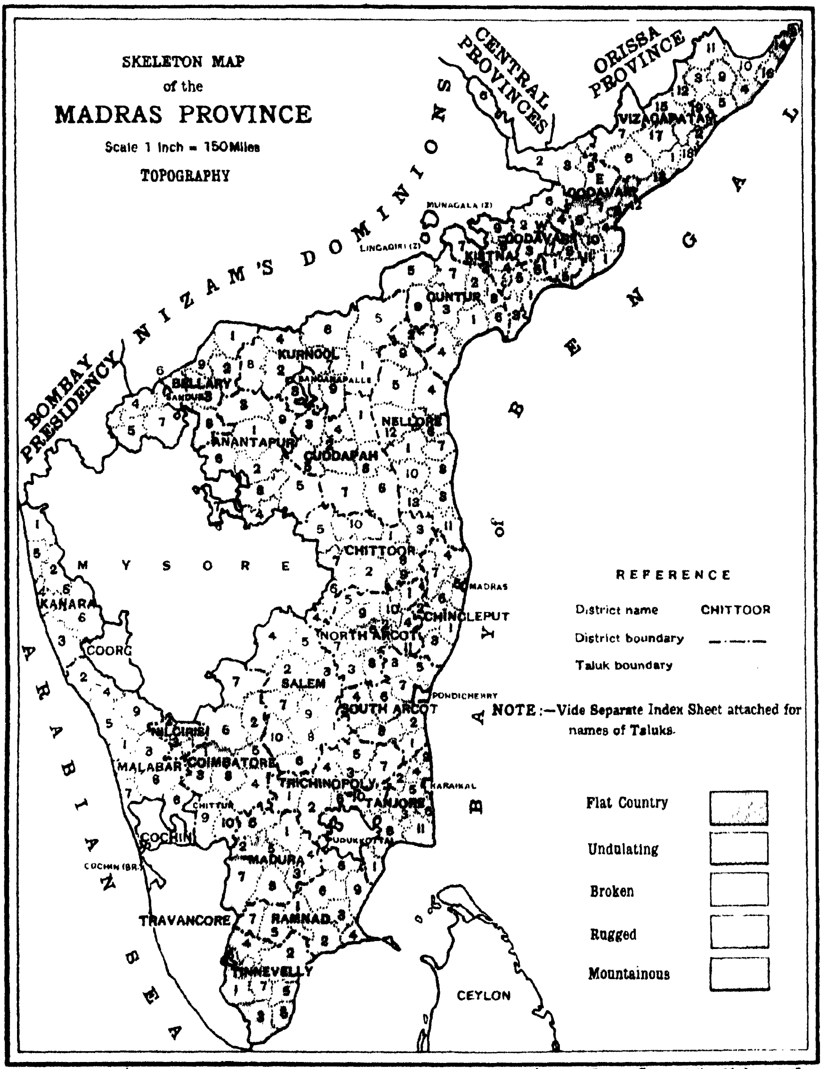
Cottage economy satisfies the physical needs of men for food and drink, clothing and housing. Their social needs have to be met by a rurban organization which provides urban amenities in rural areas. Better and more varied food, cleaner water, better clothing, better housing, more skilled work, better education and health and greater social amenities than a village can provide and such as a town does provide can

be obtained by establishing in a group of villages the kind of municipal organization—call it, a municipal union—that is now confined to towns. There is no reason why a population of 25,000 to 40,000 people spread in an area of 10 miles by 10 such as a revenue firka in Madras has, should not provide a high school, a hospital, piped-water supply, a cinema, a workshop, consumer stores, a post and telegraph office and the administrative facilities such as a town with the same population confined to an area of 10 square miles does. Science has changed our space sense and time sense. There is need to expand the limits of local Government. Rural reconstruction has largely failed in India because the village is too small for it in its material and human resources. There is need to take a larger area such as a revenue firka in Madras as the unit for rurban reconstruction. Madras with a hundred municipalities in its towns and a thousand municipal unions in its revenue firkas will enable its people and Government to have a compact grip over its life and space.

This survey represents the basis of facts of rural life, on which further construction of life may be planned. In each rural area, the differentials above and below the norm indicated in the monograph have to be studied so that the new structure may be designed in conformity with its conditions. I trust that this monograph will serve as a first step in such a reconstruction. I venture to hope too that other Provinces in India may prepare and publish similar surveys.

MADRAS,
October 1946.

S. V. RAMAMURTY.



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Monograph on Rural Problems in Madras

CHAPTER I—GENERAL

Area, boundaries and main divisions

Madras is the southernmost Province in India. It almost surrounds the State of Mysore and the small British Province of Coorg. It is bounded on the east by the Bay of Bengal and the gulf of Mannar and on the west by the Arabian Sea. The northern boundary has been formed by the circumstances of history. Going from east to west, it consists of Orissa, the Central Provinces, the Nizam's Dominions and the southern districts of the Bombay Province. The Province contains 25 districts including the City of Madras which is treated as a district for administrative purposes. It has an area of 126,166 square miles. Of this, 6,791 square miles in the districts of Vizagapatam and Godavari are Agency tracts. Twenty-three thousand nine hundred and thirty-five square miles are under zamindaris.

Mountain systems

2. The Province has two large mountain systems, the Western and the Eastern Ghats. The Western Ghats run along the entire length of the West Coast at distances varying from 50 to 100 miles from the sea. The chain of mountains is continuous except near the Palghat gap which is about 20 miles wide. The average height is about 4,000 feet but in some places heights nearer 8,000 feet are attained. The highest peak is the Dodabetta, 8,640 feet high, situated on the Ootacamund Plateau. The Eastern Ghats start from the Province of Orissa and run in a south-westerly direction until a little beyond the Kistna river where they turn to the south parallel to the coastline to a point opposite to the Pulicat lake. From here they turn south-west once again and stretch across the Province till they become merged in the Nilgiri mountains which are an outlying group connected with the Western Ghats. The Eastern Ghats are about 3,000 feet high. There are, however, a few peaks over 5,000 feet. The southern sections are lower in elevation. Besides these, there are several isolated blocks of hills, the chief among them being the Shevaroys in Salem, the Pachamalais and Kollaimalais in Salem and Trichinopoly, and the Javadi hills in North Arcot. The Province thus consists of a narrow strip of land between the Western Ghats and the Arabian Sea, a broader strip between the Eastern Ghats and the Bay of Bengal and an elevated tract lying midway between the two.

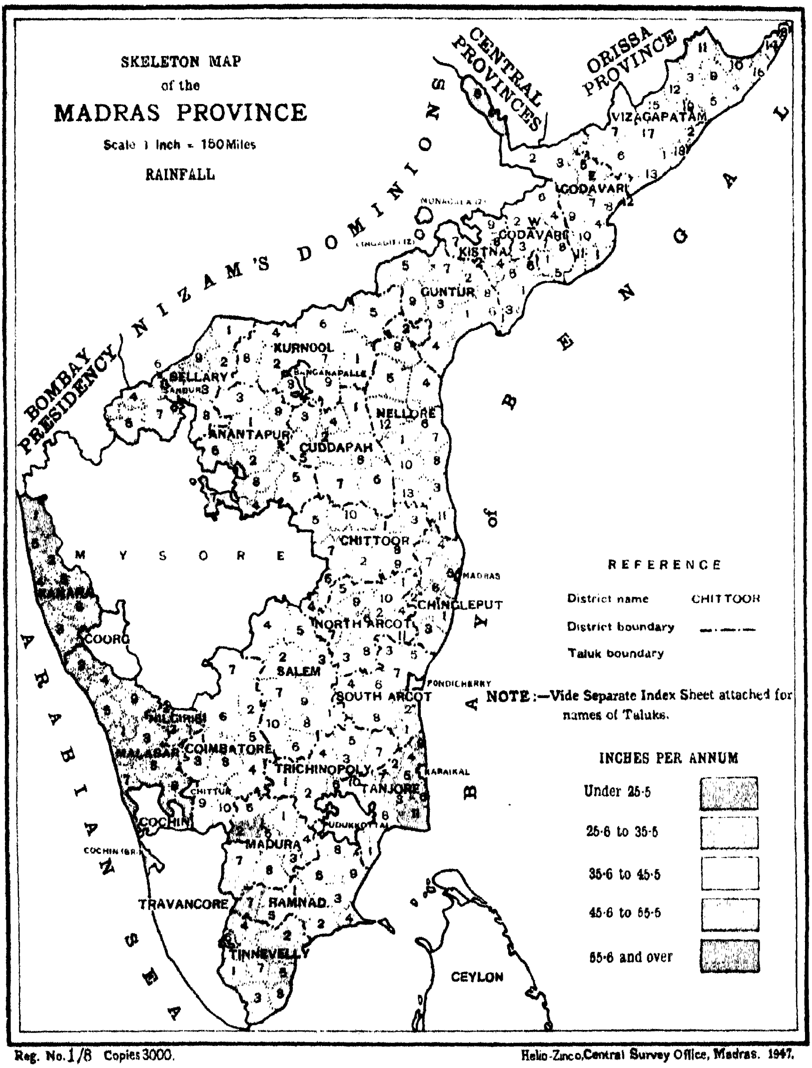
Agency tracts

3. Through the western parts of its two northernmost districts—Vizagapatam and Godavari—runs a portion of the Eastern Ghats differing in climate and physical aspects from the rest of these two districts. The jungles in these tracts are occupied by primitive forest tribes who differ in religion, language, customs and ethnic characteristics from the dwellers in the plains below them. Within these areas the ordinary law of the land is in force only to a limited extent. They are administered by special Agents to the Governor and are therefore commonly called Agencies.

Rivers

4. Practically all the rivers in the Province except the ones which flow from the Western Ghats to the Arabian Sea, rise in the West Coast and flow towards the East. The Province has three important rivers—the Godavari, the Kistna and the Cauvery, in addition to a large number of smaller rivers and their tributaries. The Godavari runs across the peninsula and is 900 miles long and receives the drainage from 115,000 square miles. Its maximum discharge is estimated to be one and a half million cusecs. It rises at Triumbak, a village about seventy miles north-east of Bombay, in the Bombay Presidency, and only 50 miles from the Arabian Sea. From there it flows in a south-easterly direction receiving the waters of the Wardha, Indravathi and Sabari. After it enters open country, the river widens out and flows by the old zamindari strongholds of Polavaram and Gutala. At Dowlaishweram in the Godavari district, there is an irrigation anicut. Here the river divides into two main streams, the eastern or Gautami Godavari and the western or Vasishta Godavari, and enters the sea near point Godavari and point Narasapur, respectively.

The Kistna river rises in the Western Ghats near Mahabaleshwar some 4,000 feet above sea level and runs southwards through Bombay Presidency for some distance before it turns east into Hyderabad, where it receives the Bhima. Further down, the Tungabhadra joins it and from there, the river is for a considerable distance the boundary between Madras and Hyderabad. The last important tributary to join it is the Musi. The river then flows through a narrow gorge in the Nallamalais and enters the plains of the Coromandel Coast. At Bezwada the river flows between two hills hardly 6 furlongs apart. An anicut is built here. Stretching away on both sides of the river lie the two sections of the delta, the eastern delta lying on the left side and the western delta lying on the right. For 40 miles below the river runs in a single stream. It then throws out the Puligedda branch. Between this and the main river lies the Divi island. The main river then flows for 15 miles and splits into three branches before it empties into the sea. The river drains 97,000 square miles and its flood discharge is about a million cusecs. The irrigation system under this river serves nearly one millon acres.



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The Cauvery rises in Coorg and flows for a considerable distance over the Mysore Plateau. It then drops into the plains of Madras at the Hogainkal falls. The chief tributaries of the river are the Hemavathi, Lakshmanathirtha and Kabbini in Mysore and the Bhavani rising on the Nilgiris in Madras. The river irrigates a large area in Mysore before it enters Madras. There are two big reservoirs on the river, the Krishnarajasagar near Mysore and the Stanley reservoir in Mettur. Hydro-electric power is developed at Sivasamudram and at Mettur dam. The Cauvery is 500 miles long and drains 31,000 square miles. The irrigated area under the delta is about a million acres.

The Tungabhadra takes its appellation from the fact that it is formed by the junction in Mysore of two rivers called respectively the 'Tunga' and the 'Bhadra'. They rise in the Western Ghats on the frontier between South Kanara and the Mysore State and after running widely different courses, unite at the sacred village of Kudali, eight miles from Shimoga, to form the Tungabhadra. The river forms the western and northern boundaries of the Province for a distance of 250 miles in Bellary and Kurnool where it joins the Kistna. The proposed site of the dam of the Tungabhadra Project is at Malappuram, where the stream cuts through the northward extension of the Sandur hills. Other rivers of importance are the Pennar, the Palar, the Vaigai, the Tambraparni and the Netravathi. All these rivers excepting the last-named are important sources of irrigation.

Rainfall and climate by regions

5. The rainfall of the Presidency can be most conveniently considered with reference to the following arbitrary divisions of the year :—

(1) January to March—the dry weather.
(2) April and May—the hot weather.
(3) June to September—the south-west monsoon.
(4) October to December—the north-east monsoon.

The divisions coincide very fairly with different parts of the agricultural year and the rainfall which usually falls in each period has a special significance (vide Appendix I). Where the hot-weather rains are reasonably good, the preparation of the dry lands for cultivation is pushed forward early and hot-weather crops of gingelly and in some cases of cholam are sown. The rains of the south-west monsoon regulate the bulk of the sowings on the lighter classes of dry lands and are thus of the utmost importance to the Province as a whole. If they are late the sowings on these soils will be untimely and the ordinary crops will suffer or others of a less valuable character have to be substituted for them. Such delay, if the rains are received towards the end of the period, is not of much consequence on the heavier soils, for, from their nature they are more retentive of moisture and are not usually sown till the later end of this period or early in October. The south-west

monsoon rains are of great value to the Province even when they fall beyond its limits, for it is on them that the Kistna, the Godavari, the Cauvery and the Tambraparni depend for their supply of water. These rivers rise in localities where the south-west monsoon rains are all important. The rains of the north-east monsoon are chiefly of importance for the supply to the rain-fed tanks. Some dry land cultivation is raised under this monsoon, but, except in the extreme south, this is usually confined to crops raised on the heavy soils at the beginning of the monsoon or to catch crops on the lighter soils towards the end of the rains. The rains of the dry weather are usually too scanty and unreliable to have much effect on agricultural practice, but when they fall, they are useful in increasing the supply of pasture and in some cases they permit the raising of catch crops or reinforce a failing irrigation supply. But the hot weather is generally a period of quiescence in agricultural work. The monsoons are mainly responsible for the weather and climate in South India.

The West Coast (Malabar and South Kanara)

6. The West Coast is a region of excessive rainfall with 100 inches to 150 inches distributed over 135–140 days mostly in south-west monsoon period and possesses a warm moist climate, quite different from the other parts of the Province. The average maximum temperature ranges from 83° to 98° and the average minimum temperature from 68° to 82°. The vegetation is typical of the tropics, and coconuts, arecanut and paddy are grown entirely with the aid of rainfall. Pepper and cardamoms either grow wild or are cultivated in cleared-jungle areas. Hill paddy and other minor cereals are grown on hill slopes. Coffee and tea plantations exist on the Wynaad ranges.

Northern Circars (Vizagapatam, East and West Godavari, Kistna and Guntur)

7. The Northern Circars receive a fair amount of rainfall up to 50 inches with an average of 30 inches to 40 inches distributed over 65–70 days mostly in the south-west monsoon period. Paddy is cultivated under rainfed conditions in the " lankas " (islands in the river) and in the sub-montane regions but irrigated paddy is cultivated in the lands near the sea in the rich deltas of Godavari and Kistna. Groundnut and sugarcane are important crops in this tract. Mangoes are largely grown in Vizagapatam and Godavari. Coconuts are cultivated along the sea-coast villages and lankas of rivers. The average maximum temperature ranges between 86° F and 99°F and the average minimum temperature between 64°F and 79°F.

The Deccan (Kurnool, Bellary, Anantapur and Cuddapah)

8. The Deccan is one of the most arid parts of the Province situated in the interior and on a plateau. The annual rainfall

varies from 20 inches to 30 inches distributed over 50 to 60 days. The temperature may rise easily to 110°F in summer and fall to 55°F in winter. The low rainfall is generally insufficient to cultivate the light red soils though it is generally sufficient for the deep moisture-retaining black soils. Here too the moisture is very carefully conserved by the efficient practice of dry farming husbandry. This tract is subject to famines, one good year being followed by two or three bad ones and hence fodder and grains are stored in times of plenty. Three-year old stocks are common in Bellary and grain is stored in underground pits. The chief crops are millets like jonna, korra, tenai, cholam, sajja, varagu and groundnut and cotton.

The Carnatic (Nellore, Chingleput and South Arcot)

9. The Carnatic districts in normal seasons have a well-distributed rainfall ranging from 35 inches to 40 inches distributed over 70—75 days. At Madras the mean temperature is between 75°F and 88°F. The climate is equable. There is hardly a difference of 15° between maximum and minimum temperature. The land consists mostly of alluvial flats with gentle undulating hills. A good deal of cultivation is carried on by irrigation from tanks and wells. Paddy, groundnut and millets are the more important crops. In the coastal regions, coconuts and casuarina are grown, especially near Madras.

The Central districts (North Arcot, Chittoor, Salem and Coimbatore)

10. The Central districts are arid regions but in climate and cropping are similar to the carnatics. The rainfall varies from 20 inches to 30 inches distributed over 60 days. At Coimbatore the average maximum temperature is between 85° and 96° and the average minimum temperature between 64° and 74°. Sowings are generally done with the aid of the north-east monsoon rains. The climate of Coimbatore offers a few points of interest, as it is somewhat unusual. Its position close to the high range of hills running down the centre of the peninsula and just north of the Palghat gap determines its main features. The low hot weather temperatures are partly due to the elevation of the region which is 1,200 to 1,300 feet above mean sea level. The important crops are cholam, cotton, groundnut and millets. In addition, tobacco is grown in the plains and tea (in Coimbatore) and coffee (in Salem) on the hills.

The Southern districts (Trichinopoly, Tanjore, Madura, Ramnad and Tinnevelly)

11. The Southern districts are benefited more by the north-east monsoon than by the south-west monsoon. Trichinopoly and Tanjore are more wet than Madura, Ramnad and Tinnevelly. The

last three are arid regions mostly. The average maximum temperature ranges from 83° to 104° and the average minimum temperature from 68° to 79°. In Tanjore, paddy is the most important crop grown under irrigation from the Cauvery. In Trichinopoly, paddy, cholam, groundnut and millets are grown (both dry and irrigated areas). In Madura, Tinnevelly and Ramnad, paddy is grown in river valleys and under tanks but cotton in all the districts, cholam in Madura, cumbu in Tinnevelly and cumbu, ragi and varagu in the Ramnad district are important. Groundnut is grown in the Madura and the Ramnad districts.

The Nilgiris

12. With an elevation of 3,000′—8,000′ the climate of the Nilgiris is different from that of all other parts of the Presidency. The rainfall is about 60 inches in 150 days. The average maximum temperature varies from 60° to 75°F while the average minimum temperature is between 45°—55°F. The climate is always cool and admits of the cultivation of sub-tropical and temperate region crops. The important cultivated crops are potatoes, wheat and barley, English vegetables, ragi, samai and korali. Tea and coffee are the major plantation crops.

Soils

General features

13. Soil is defined as the " outer weathered layer of the solid crust of the earth." The solid crust referred to comprises the various kinds of rocks that have been described and classified by Geologists. The first stage in soil formation is the natural disintegration or pulverization of solid rocks. The next stage is a process of synthesis by which various types of soils are formed from the disintegrated rock materials. As soils are derived from rocks, the nature of the rock greatly influences the kind of soil formed from it.

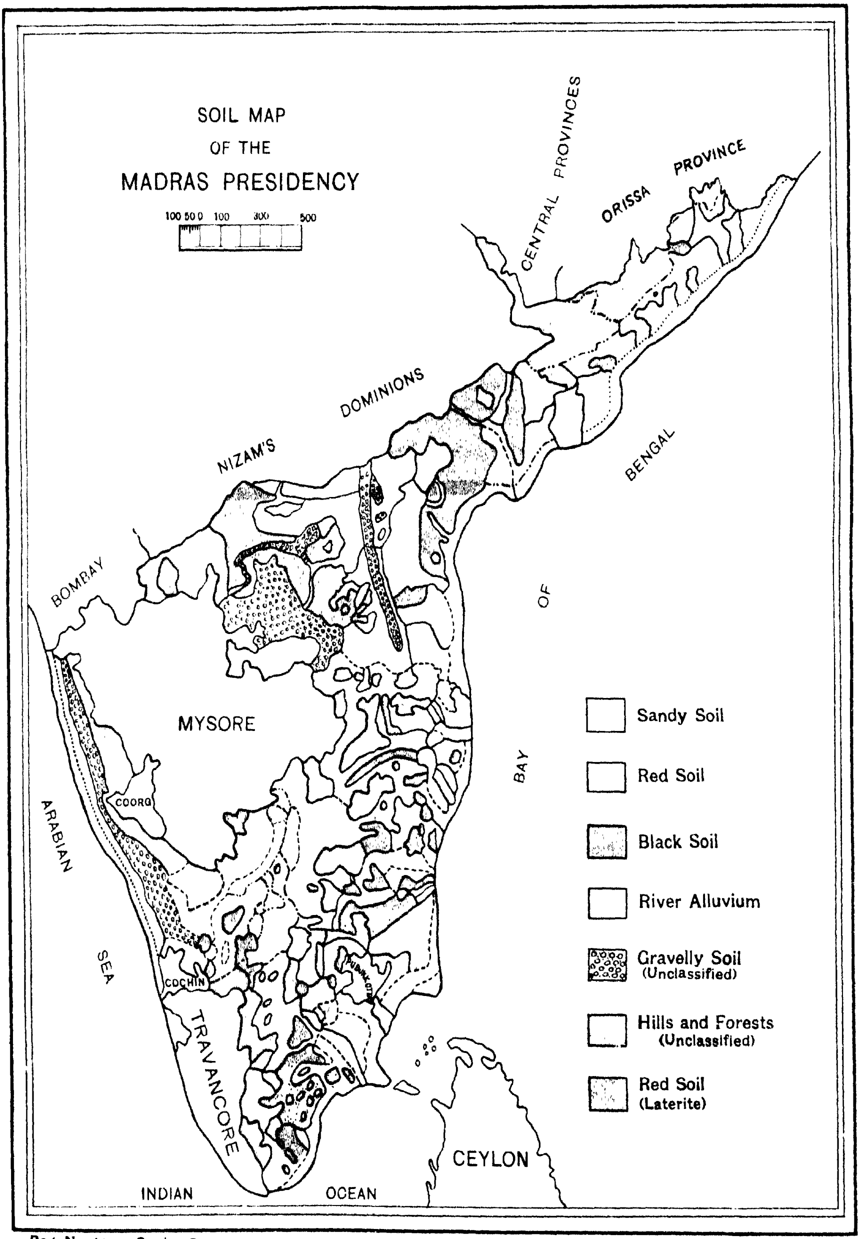
Soil classification and their characteristics

14. The soils of the Presidency can be divided into four main types :—

(i) the Alluvial soils;
(ii) the Black Cotton soils or " Regur " or " Regada ";
(iii) the Red soils; and
(iv) the Laterite soils.

Alluvial soils

15. The Alluvial soils in both coastal and deltaic areas being of a transported nature bear no relation to the rock on which they lie in respect of chemical and mineralogical properties. They are found in the deltaic tracts of Kistna, Godavari and Cauvery and in portions of South Arcot and Tinnevelly. Alluvial profiles may be



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either coastal or deltaic and are characterized by alternate layers of sand and silt. The nature of the silts brought by the different rivers is not uniform; so also the soils derived from them. For example, the rivers Kistna and Godavari flowing across vast basaltic tracts transport rich black silt, whereas the Cauvery traversing through the Archaean formations carries silt of low value and of lighter colour. According to the Settlement Department's classification the extent of alluvial soil in the Presidency is one million acres. They range from silty loams to heavy clays and are of varying depth. They are generally fertile. Paddy is the main crop grown, though sugar-cane, plantains and turmeric are also cultivated in the higher reaches.

Black cotton soils

16. The Black Cotton soils form roughly one-third of the cultivated area of the Province and are estimated to cover 10 million acres. They are found extensively in Kurnool in the Ceded Districts, Guntur and Kistna in the Northern Circars and in Ramnad, Trichinopoly and Tanjore in the South. Guntur has the largest extent, 90 per cent, followed by Ramnad 70 per cent, Kistna 66 per cent and Kurnool 60 per cent. Guntur, Bellary, Kurnool and Kistna districts account for nearly half the black soil area in the Presidency, the rest being distributed in other districts. Examination of a number of profiles in connection with the Tungabhadra Project resulted in the division of these soils into five distinct groups. (i) Deep black soil with gypsum, (ii) Deep black soil without gypsum, (iii) Shallow black soil with gypsum, (iv) Shallow black soil without gypsum and (v) Irrigated black soil. This grouping is based on the depth of the soil and also on the presence or absence of gypsum in the lower zones. The black soils in general have a higher content of finer fractions and may be classed as clay soils ranging from heavy clay to clay loam. They crack very deeply in summer and as a result of having a high clay content they possess low permeability, high moisture-holding capacity (65—85 per cent), low subsoil drainage and a high surface drainage. This results in a certain amount of soil erosion. They usually contain appreciable soluble salts in all horizons especially in the lower layers, though these do not generally reach the toxic limit for plant growth. Cotton and sorghum are the important crops of the black soils in the northern districts and cotton, sorghum for fodder and cumbu in the southern districts. In regard to chemical composition, the black soils have a high per cent of potassium, lime and magnesium but the nitrogen content is low as is common to Indian soils generally ranging between ·012 to ·05 per cent. Phosphoric acid is meagre in nearly all cases.

Red soils

17. Red soils form two-thirds of the cultivable area, being 20 million acres in extent. The red soil areas are particularly confined

to the West Coast and the Central districts. There are deep and shallow profiles. Generally these soils are not as deep as the black ones. The properties are exactly the opposite of the black soils. They are comparatively more open in texture being loamy to sandy, rarely clayey, and are easily drained. They are deficient in organic matter, and poor in plant nutrients. They absorb rains readily but do not retain the moisture long. They get fit for sowing earlier than the black soils. The water table in the red soil areas is fairly high and this facilitates irrigated crops being raised. Lift irrigation is a common feature of the central districts and almost all crops are grown. Generally, the amount of lime is small, Magnesium is not high and phosphoric acid is uniformly low.

Laterites

18. The term laterite was first used in 1807 by Buchanan to apply to the brick coloured earth which is suitable for making air dried bricks. Here too the colour has failed to prove a trustworthy guide; for, some red earths resemble laterites, while there are laterites which are not red. The red colour of laterites is due to their Iron Oxide content. The formation of laterites is characterized by the fact that during the weathering of silicates the silicate is almost entirely leached out while the sesquioxides remain and sometimes are actually accumulated from elsewhere. If the parent rock contained iron compounds in addition to Aluminium the soil formed takes on a red colour. Laterite is easy to cut and shape when first dug and becomes hard and tough after exposure to air. After exposure it is usually covered with a brown or blackish brown crust of Limonite. A freshly broken piece of rock is mottled with various tints of brown, red and yellow and a considerable proportion sometimes consists of white clay. In many forms of laterite the rock is traversed by small, irregular tortuous tubes of ¼ inch and ½ inch diameter, lined with a crust of Limonite often filled with clay except at the surface. The laterites are formed in regions which are subjected to alternate heavy precipitation of over 100 inches of rainfall per annum and a dry hot period. Geologists in India are agreed upon classifying laterite into high level or non-detrital and low level or detrital laterite. The two terms refer merely to the position occupied by the two varieties on the highlands or near the coast. The ordinary or low level laterites under cultivation, are rich in Nitrogen content. They contain fair amounts of total Phosphoric Acid (0·05—0·07 per cent). This is not easily available as most of it is in combination with Iron and Aluminia as phosphates, and consequently the available fraction is very low. The Potassium content varies from 0·1 to 0·2 per cent and the Calcium from trace to 0·2 which is low for Indian soil. Laterite soils are heavy but well drained. They are of low fertilities and are subject to leaching under heavy rainfall conditions. Paddy is the chief crop grown in these soils. Other crops are ginger, pepper and plantains.

Saline soils

19. Saline soils occur scattered under a variety of environments and in the midst of other soil occurrences. They are for that reason considered interzonal formations and are found in arid as well as humid regions. The one characteristic feature of these soils is a high amount of Sodium Clay in them with or without toxic concentration of soluble salts of Sodium and Magnesium. Saline soil profiles have been studied in connection with the Gundlakamma (Guntur district) and Toludur (South Arcot district) projects and the reclamation of Alkali lands in Trichinopoly district (Kattalai high level channel). It was found that wherever there was alkalinity the soils were heavy in character, the *pH* (Hydrogen ion concentration) rising up to even 10 and the proportion of exchangeable Sodium increasing considerably with the result that the degree of alkalinity reaches even 75 per cent.

CHAPTER II—INFLUENCE OF DEMOGRAPHY

20. The population of the Madras Province according to the census of 1941 was 49,341,810. Fifty years ago, in 1891, the population of the Province was only 33,732,664 (vide Appendix 2). During this half a century, it has increased by 46·3 per cent.

Population of the Madras Province [1]

Year of census.		Population.	Year of census.		Population.
1871	.. ..	31,281,177	1911	.. ..	39,129,111
1881	.. ..	30,868,504	1921	.. ..	40,126,512
1891	.. ..	33,732,664	1931	.. ..	44,205,243
1901	.. ..	36,258,955	1941	.. ..	49,341,810

Net increase over 1891—15,609,146.
Percentage of increase over 1891—46·3 per cent.

Review of the population increase over the 5 decades

21. The increase in population during the first two decades of the fifty-year period was normal. However, between 1911 and 1921, the population curve shows a marked flattening, mainly due to the effects of the influenza epidemic of 1918 which visited Madras with great severity. Its effects were felt over the whole Presidency, but were particularly noticeable in the Deccan and in the Agencies. During the 1921 census many districts including Tanjore showed an actual diminution in population. In 1911–21, the population of Bellary went down by about 11 per cent. There was a sudden jump in the population trend during the 1931–41 period with an increase of over 5 millions, indicating an average annual increase of half a million. This was a period of economic depression.

22. In the following table the growth of population during the last half a century in four characteristic and representative areas of the Province is given :—

Population growth in four characteristic areas [2]

Areas.	1891.	1901.	1911.	1921.	1931.	1941.	Percentage increase in 50 years.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 West Coast— Malabar .. South Kanara ..	3,704,253	3,930,451	4,210,326	4,346,239	4,906,185	5,452,941	47
2 Godavari, Kistna Delta— East Godavari. West Godavari. Kistna .. Guntur ..	4,020,262	4,520,892	5,141,043	5,418,751	6,192,977	6,991,959	73

[1] Census of India, 1941, Volume II, Madras, page 8.
[2] *Ibid.*, pages 9–12.

Areas.	1891.	1901.	1911.	1921.	1931.	1941.	Percentage increase in 50 years.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
3 Deccan—Cuddapah, Kurnool, Bellary, Anantapur	3,444,163	3,633,121	3,761,856	3,621,106	3,994,543	4,425,411	28
4 Cauvery Delta—Tanjore	2,230,930	2,248,051	2,366,045	2,329,915	2,385,920	2,563,375	15

23. We find these four regions having distinctive population growths. Examining the Tanjore delta first, one finds that the population curve for the five decades is practically flat. This shows that the population of the district has reached a level of saturation. The district has a very high density of population with 686 persons to the square mile. Irrigation in Tanjore is as old as the ancient Cholas. The land has been cultivated since the dawn of history. It has now reached a level of production which is low but steady and unvarying. The adjustment between production and population must have been effected in this delta several years ago. However, further deterioration is prevented in Tanjore by the existence of a large community of intelligent persons. It is a matter of general observation the world over that different social divisions correspond to different birth-rates, the rate increasing ordinarily as we descend the social scale. In the lower grades, forethought and consideration for the future are less prevalent. Among the higher classes the parents' responsibility and desire to preserve high living standards act as a check to the growth of the family. The Tanjore district is one of the most advanced and sophisticated regions of the Presidency. Education in the district is diffused, literacy is high, a larger proportion enter the professions and services and a substantial proportion live in the towns. All these may have contributed to a lower birth rate. [1] Sir Malcolm Darling has expressed the view that in this country every material blessing is ultimately neutralised by an increase of population. He exemplifies this by the increase in the population in Lyallpur district in the Punjab from 30,136 in 1891 to 151,351 by 1931. The Tanjore district is seen to be an exception to this principle. This is not to say that a conscious desire for an increased standard of life has kept down the population of the district. All that can be said is that, with a steady quantum of production due to an ancient irrigation system, and a low enough living standard, conscious effort is seen rather in further preventing deterioration of standards. The need for raising the standards of life exists as much in Tanjore as elsewhere.

24. The second region, i.e., the Godavari and Kistna deltas, exemplifies the Malthusian Law of progression in relation to the means of subsistence in an effective manner. Before the opening

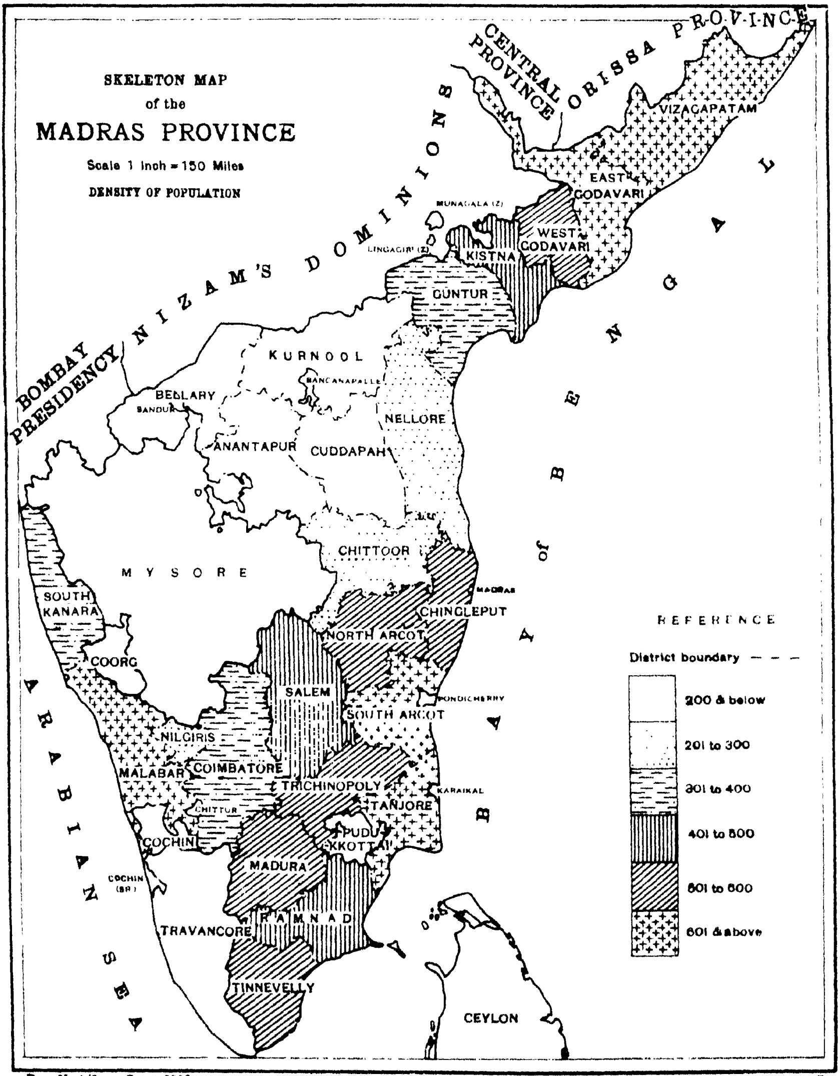
[1] The Punjab Peasant in Prosperity and Debt by M. L. Darling, pages 273–275.

of the Irrigation System in 1850–55 the Godavari-Kistna delta was a famine tract. The District Gazetteers of Godavari and Mr. Walch's Engineering History of the Kistna delta give interesting details of the conditions in these districts before the irrigation schemes were launched by the genius of Sir Arthur Cotton. In Godavari, before the construction of the anicut, the whole district suffered heavily on several occasions from terrible famines due to drought. [1]Mr. Walch chronicled these famines in detail, especially the one in 1832–33 which did considerable havoc. The recurrent famines and the devastating losses they caused set the Government of the day thinking, and they resolved to push forward the Godavari and Kistna schemes principally as a measure of protection. The work commenced in 1847 and was completed by about 1855. The population of the Delta tract according to the 1861–62 census was 2,561,252. By 1901, that is, in 40 years, the population had grown to 4,520,892 and by the 1941 census the population of the Delta rose to 6,991,959. During the 80 years the population has increased by 274 per cent or nearly three-fold. The increase in population is mainly due to the increased production from the land brought about by irrigation. The Delta area, apart from sustaining the population of the districts, now exports large quantities of food-stuffs to other deficit districts of the Province. But one outstanding fact remains. Though the total wealth of the deltas has increased as a result of the irrigation system, the *per capita* income has not necessarily increased. Increase of wealth is offset by increase in population. A slight rise of standard must have taken place, but this is inconsiderable.

25. The population growth in the Ceded Districts on the other hand is considerably below normal compared to the Presidency average. The Ceded Districts happen to be the principal famine area of the Province, where considerable uncertainties exist in the expectation of the harvest. Nowhere is it more true that agriculture is a gamble in the monsoon. There are no irrigation works barring the Kurnool-Cuddapah Canal. The proposed Tungabhadra Project will make agriculture a more steady occupation.

26. In the West Coast the population growth is at about par with the Presidency growth, being 47 per cent as against the Presidency average of 46 per cent. A steady increase is maintained, though the pressure of population is keenly felt. This is due to the increase happening over an already heavy density. It is offset to some extent by bringing new areas under cultivation. The cultivated area in the West Coast increased from 1,358,000 acres in 1902 to 2,099,723 acres in 1942. This was possible because the percentage of uncultivated land to total area was comparatively high in the two districts of Malabar and South Kanara. But the heavy pressure of population on land is not relieved by the increasing

[1] G. T. Walch, Engineering Works of the Kistna Delta, pages 13–14.



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areas brought under cultivation and the agricultural production of the two districts is not able to provide sustenance for their population. These districts have to supplement their requirements by imports from other districts. In pre-war days the districts were dependent on imports of Burma rice.

Density of population

27. An examination of the population densities in the various districts (vide Appendix 3) shows that predominance of rice cultivation co-exists with a high density of population. Millets can be grown under all conditions from places of low rainfall to medium rainfall. The labour requirements for cultivating an acre of millets are considerably less than for rice. Millets are therefore suitable for extensive cultivation. We find, for instance, that the average holding in the Ceded Districts is considerably larger than in the Tanjore district. Rice is generally grown under irrigated conditions and irrigation under dams and anicuts has given a certainty to the cultivation which is lacking in rainfed areas. In the West Coast where rice is rainfed, the monsoon may be sometimes late and occasionally of subnormal intensity, but it never fails. The produce obtained per acre of rice is also higher. It yields under intensive cultivation about 2,500 lb. per acre, and at the prevailing low standards provides subsistence for a year for a family of five. This provides for a density of more than 2,000 per square mile.

Rural and Urban populations

28. Out of the total population of over 49 millions in the Province, 41 millions live in villages. Only 8 millions inhabit the towns, i.e., places of usually not less than 5,000 inhabitants possessing definite urban characteristics. Urbanisation in Madras has made little progress. The distribution of urban and rural population from 1891 to 1941 is given below :—

[1] Census year.	Urban.	Rural.	Percentage of urban to total population.
(1)	(2)	(3)	(4)
1891	3,406,105	32,224,335	9·6
1901	4,275,178	33,923,984	11·2
1911	4,897,626	36,512,778	11·8
1921	5,278,705	37,040,280	12·5
1931	6,337,256	40,402,851	13·6
1941	7,864,883	41,476,927	14·9

The proportion of the rural population to total population is still as high as 84 per cent. Though this is lower than the all-India figure which is 87 per cent, compared with other rural countries this is very high. [2]The proportion of rural population to total population is 46 per cent in Canada, 49 per cent in Northern Ireland and 51 per cent in France.

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[1] Census of India, Madras, 1891 to 1941.
[2] The Indian Rural Problem by Sir Manilal B. Nanavati, page 23.

The village

29. From time immemorial the village has been the unit of communal life in India. [1] There are 35,430 villages in the Province, ranging from small aggregations of a few huts to units bordering in size and mode of life to the smaller towns. The larger villages are generally found in the deltaic tracts of the Province. Agriculture is the dominant if not the sole occupation in the villages. Each village is populated with four types of persons :—

(*a*) The landowners who own the land they cultivate, with permanent rights as owners and dealing directly with the Government for revenue purposes as in ryotwari areas or tenants with hereditary occupancy rights as in zamindari areas. The smaller landowners cultivate their lands themselves with the help of their families, hiring additional labour occasionally during the transplanting and harvesting seasons. The larger landowners as well as landowners belonging to certain communities like the Brahmans do not themselves cultivate the land.

(*b*) Below the landowners are tenants and agricultural labourers. A single individual will often be a tenant under a big landlord as well as a cultivating owner in respect of his own land. The agricultural labourers constitute a mixed lot some being permanently attached to landowners or tenants on fixed wages and others working on a casual basis.

(*c*) In almost all the villages we come across artizans like the carpenters and ironsmiths who provide the people with simple agricultural tools and country carts.

(*d*) In the fourth class are the miscellaneous population consisting of small shopkeepers, the village physician and other professionals. A certain fluidity always exists in respect of this division. Based on the census of 1911 the Board of Revenue estimates the number of landowners at 5,487,741, tenants at 1,742,013, labourers at 5,509,204 and artisans at 1,558,889 in the Province.

30. The old Indian village was a self-contained economic and social unit. This is inherent in all ancient civilizations based on agriculture rather than on industry. Villages were largely self-governing entities and their vestiges are seen even to-day in Panchayats constituted from amongst the leading persons of the village to deal with local problems. For practical purposes " the cultivator is thus a member of a definitely organized community which has, as far back as history of social organization in India can be traced, been dependent on itself for the means of living and to a very large extent for its government." This has naturally resulted in considerable self-reliance on the part of the ryot within the sphere of his existence. In recent years the old aggregations of village life have changed. This change may be summed up by saying that from being a unit of economics and civilization the

[1] Census of India, 1941, Volume II, Madras, page 2.

[2] Report of the Royal Commission on Agriculture in India, 1928, Chapter XIV, page 479.

village is tending to become a unit of agricultural production only. Time was when the culture of the country was developed in the village and received its reward in the courts of kings. The time is now when the results of studies made in urban surroundings have to be carried to the village for the benefit of the cultivator. The easy means of communication now available have made the village less self-contained than before. The results of modern knowledge combined with facilities in transport make it unnecessary for a single small village to be considered as a unit for several purposes such as medical facilities, demonstration of research in agricultural farms and the like. For such economic purposes as marketing organizations or the provision of credit also it is not necessary to consider each village, irrespective of its size, as a unit of organization. While therefore, the village will continue as a unit of cultivation and will house the community engaged in this occupation, its self-contained character is gradually diminishing, and in the coming years we may look forward to communal life being organized on the basis of units consisting of groups of villages within easy access of one another.

31. Within the village itself changes are taking place. The impact of industrialization is felt even in the interior villages. In some villages we come across some of the primary manufacturing processes. Rice-milling by power machines which was almost in its early stages in the beginning of the century has expanded to such an extent that in rice-growing areas one comes across a small mill even in the interior villages. The ginnery is a common feature in many cotton areas and the decorticator in groundnut areas. In this Province the development of the Pykara, the Mettur, and the Papanasam Hydro-Electric Schemes has done much to alter rural life in the Central and Southern districts. This change is particularly seen in Coimbatore and to a small extent in Salem. The development of the textile industry in Coimbatore and Tiruppur in the Coimbatore district has provided employment to a large number of villagers around the area. The use of electric power for pumping water has modernised agriculture to a large extent in the Coimbatore district. In these areas villages present a brighter appearance than before, with shops as well as a better class of homes, which are lighted with electricity. This is one side of the picture. On the other side the low income of the average villager, the insanitary surroundings in which he lives, absence of facilities for education as well as medical aid combined with the insecurities of an agriculture dependent on rainfall are sad features of village life. The vast increases in population continue to neutralise better and more secure yields of crops. We are still confronted with a situation in which even though the wealth of the country increases, the people continue to be poor.

Urban population

32. The urban population represents only a small portion of the total population, and as alluded to earlier, constitutes only 16 per

cent of the total. It consists of industrialists, businessmen, their employees and urban labourers. The Government administrations also employ a small portion of the urban population in the district and taluk headquarters. Fifty years ago the total urban population was nearly 3½ millions. To-day it is nearer 8 millions; in other words the urban population has doubled in half a century. One of the most important factors contributing to the growth of towns is the railways and the consequent growth of trade. Other factors are the development of industries employing large numbers of labour. The development of the textile industry in Madura and Coimbatore has greatly contributed to the increased population of those cities. Unemployment in rural areas starts an exodus to urban areas in search of employment. This goes on every day and the attractions of the town are always tempting to the villager. The landless casual labourer is not tied down to the village as the others are and likes to try his fortune in the town. But the main factors are the increase in trade and development of industries. The rate of growth of urban population is seen to be faster than the rate of growth of total population.

Health and Diseases

33. Increase of population is judged by the vital index, which is the ratio of births to deaths expressed as a percentage of the latter.

Vital index of the Madras Province[1]

Year.	Vital index.	Year.	Vital index
1934	141	1940	155
1935	149	1941	155
1936	162	1942	150
1937	157	1943	123
1938	166	1944	116
1939	153		

The vital index has been steadily rising from 149 a decade ago, touching a peak of 166 in 1938. Since the war started, there has been a decline and the vital index was only 116 in 1944. This was due to the extremely difficult living conditions brought about by the war. A general and widespread scarcity of essential commodities and an extraordinary increase in living costs have, with other altered factors such as abnormal seasonal conditions and restrictions of transport facilities contributed to a general lowering of the vitality of the population, making it more susceptible to disease and have paved the way for severe epidemics of cholera and plague. However, this must be considered only as a passing phase and with the return of normal conditions, the vital index may be expected to reach its normal level.

[1] Administration Reports of the Director of Public Health from 1934 onwards.

Births and deaths in the Madras Presidency[1]

Year. (1)	Total births. (2)	Birth rate per mille. (3)	Total deaths. (4)	Death rate per mille. (5)
1935	1,671,186	35·5	1,124,336	23·9
1936	1,659,625	35·7	1,023,839	22·0
1937	1,701,662	36·2	1,054,430	22·4
1938	1,709,545	36·0	1,032,052	21·7
1939	1,694,751	35·3	1,111,281	23·2
1940	1,699,842	35·1	1,097,940	22·7
1941	1,717,133	34·7	1,135,837	23·0
1942	1,684,023	33·81	1,120,129	22·49
1943	1,565,644	31·12	1,270,687	25·25
1944	1,494,134	29·39	1,291,418	25·4
Average ..	1,659,755	34·3	1,126,195	23·2

[Rates calculated on the annual estimated population.]

The birth rate

34. Over one and a half million babies (1,659,755 is the average for the decade ending 1944) are born every year in this Province. There was a steady increase in the birth rate and the peak of 36 per 1,000 of population was touched in 1937 and 1938. There was a slight decline in 1939. Since the outbreak of the war in 1939 there has been a steady decrease in the birth rate. In 1944, it was 29 ;39. Madras stands second only to the United Provinces where it is 42 ;57. The lowest birth rate in India is in Sind, where it is 16 ;32. Compared to other nations of the world, Indian and Madras levels are certainly high as seen from the following table :—

	[2] Birth rate per 1,000.		[2] Birth rate per 1,000.
Canada	20·3	Australia	17·7
United States of America.	17·3	Japan	27·0
Germany	20·3	India	33·0
United Kingdom ..	15·3	Madras	34·3

The death rate

35. Over a million people die every year of various causes in the Presidency (1,126,195 was the average during the decade ending 1944). The average number of deaths per 1,000 of population

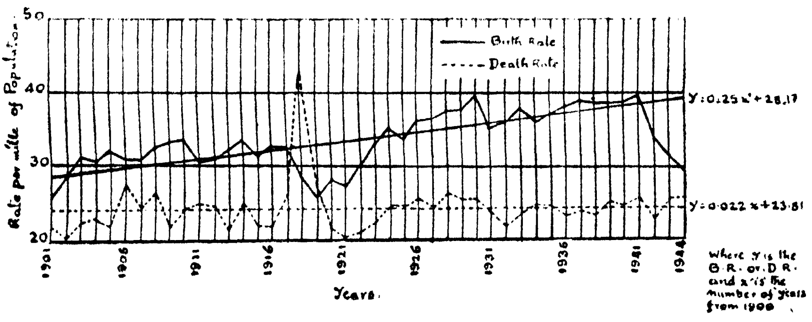
[1] Administration Reports of the Director of Public Health, from 1935–1944.
[2] A plan of Economic Development for India, Part I, 1944, page 11.

during the decade ending 1944 was 23·2. In 1935 the death rate was 23·9; in 1938, it touched the lowest level of 21·7. The rate gradually increased and the rate was 25·25 in 1943 and 25·4 in 1944. The increase, as explained before, is attributable to war conditions. The highest death rate in India as in the case of birth rate is in the United Provinces. Orissa comes next, closely followed by Madras. Sind again has the lowest death rate.

The death rate in Madras compared to the all-India average and other nations of the world is at a hight level.

	Death rate[1] per 1,000.		Death rate[1] per 1,000.
Canada	9·6	Australia	9·9
United States of America.	10·6	Japan	17·6
Germany	12·3	India	21·8
United Kingdom ..	12·2	Madras	23·2

BIRTH AND DEATH RATES IN THE MADRAS PROVINCE FROM 1901.
(Based on the Census population.)



From the chart showing the birth and death rates in the Province from 1901 to 1944, it is seen that the general trend for the recorded birth rates has been, to rise, except for two marked falls, commencing in the years 1917 and 1941, the periods of the two world wars. The recorded death rate on the other hand, except for the spurt in 1917–19 (which includes the period of the influenza pandemic) has remained fairly constant round about 24 per 1,000. Without taking into account the omissions in the birth and death registration, which might be considered to have progressively but slowly declined in the period, the chart shows that this Province has had during the period, a birth rate which, on

[1] A plan of Economic Development for India, Part I, 1944, page 11.

the whole, tended to increase, while the death rate remained fairly constant. Thus the population of the Province on the whole continued to grow at an increasing rate during the period. The falls following the two world wars have to be considered as temporary set backs. This is in striking contrast to the experience of Western countries where the rate of growth of the population has tended to fall. Thus all schemes to be formulated in this country, which have anything to do with population, will have to take into account the probability of the continued rapid growth of population in the immediate future, barring the possibility of checks to that growth by widespread famines (such as the recent Bengal Famine) or epidemics.

Causes of death

36. The annual deaths from infectious and contagious diseases vary from year to year. Of these the most important is cholera. There is a well defined periodicity in the occurrence of this disease, roughly at seven-yearly intervals. There was an epidemic in 1935 and 1936 when an aggregate mortality of 68,573 was recorded. After an interval of about 7 years the disease again broke out as an extensive and severe epidemic in 1942 and 1943. The mortality was 52,381 in 1942 and 117,039 in 1943. It was only 18,318 in 1944. Smallpox is the next important contagious disease. This is responsible for an annual mortality ranging from 2,500 to 12,500. It is found all over the Province and is seasonal in its incidence. Plague is another imported disease in this Province. Its incidence, however, is generally restricted to certain districts like Coimbatore, the Nilgiris and Salem. The annual mortality was gradually coming down from a peak of 2,358 in 1934 to 324 in 1939. Since then there has been an increase. The number of deaths in 1944 was 1,738. The largest number of deaths recorded under a single item is under " Fevers ". The " Fevers " entry in the village register covers probably instances of practically every disease met with in India. The most important of them is malaria which takes a large toll every year. [1] Mr. Sinton, late Director of Malarial Survey of India, considered from the evidence available, 25 per cent of the " fever " deaths as a minimal estimate of the average proportion of such deaths due directly to malarial infection. Based on this the annual mortality due to malaria in Madras is estimated at 75,000. The incidence of malaria as a cause of sickness, death and economic loss is so heavy as to nearly out-beat the combined effects of all epidemics like cholera, plague and smallpox. Other fevers of importance are influenza, relapsing fever and rheumatic fever. All these fevers together take away 225,139 lives annually. Respiratory diseases account for 100,846 deaths. Appendix 4 shows the number of deaths from principal causes during the last ten years.

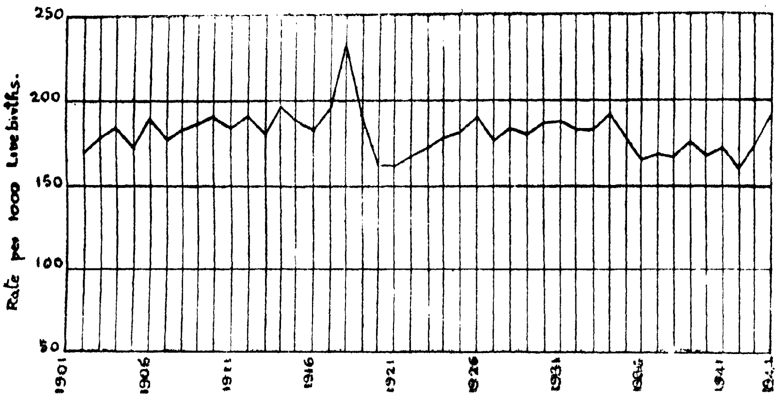
[1] What Malaria costs India by Lieut.-Col. J. A. Sinton, page 4.

Infant and maternal mortality

Infantile and maternal mortality in Madras Presidency, 1935–44

Year.	Infantile mortality. Total number of infant deaths in the Presidency.	Infantile mortality per mille.	Percentage to total deaths.	Maternal mortality. Total number of deaths.	Maternal mortality per mille.
(1)	(2)	(3)	(4)	(5)	(6)
1935	298,396	178·47	26·5	14,439	8·53
1936	272,393	164·04	25·0	13,451	8·04
1937	288,920	169·70	27·0	14,589	8·46
1938	283,930	166·04	27·5	15,392	8·87
1939	297,474	175·50	26·8	15,448	8 97
1940	286,688	168·66	26·1	14,939	8·65
1941	293,462	170·91	25·8	15,906	9·13
1942	[1] 268,895	159·67	24 1	14,687	8·60
1943	269,744	172·29	21·2	13,467	8·49
1944	287,542	192·44	22·3	15,113	9·98
Average per year.	284,744	171·77	25·2	14,743	8·77

INFANTILE MORTALITY RATE PER 1,000 LIVE-BIRTHS FROM 1902



37. It is seen from the chart that the registered infantile mortality rate in this Province during the period from 1902 to 1944 has fluctuated between 150 and 200 per 1,000 live births, except for the rise in 1918, the year of the influenza epidemic. The trend of infantile mortality was generally downward during the period from 1926 to 1942 but there was an increase in 1943 and 1944 which must be attributed to war time conditions in consonance with the general death rate. Compared with other countries and the all-India average, the position is none too satisfactory.

[1] Lowest recorded in the ten years.

[1] **Infantile mortality—Deaths under one year per 1,000 live births**

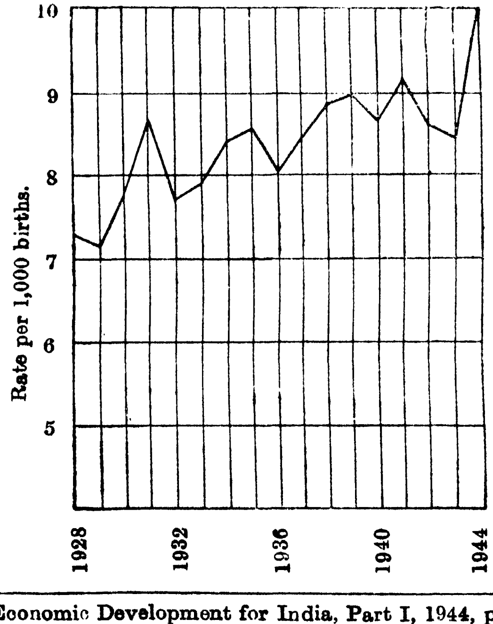
Canada	61	Australia	38
United States of America	48	Japan	114
Germany	60	India	167
United Kingdom	53	Madras	172

38. The infantile mortality rate in Madras is more than three times that of the United Kingdom and is " an indication not merely of the state of public health but of a vast source of misery and waste "[2]. The main diseases responsible for high infant mortality are disorders of the alimentary system and respiratory diseases which are traceable to defective nurture consequent on the poverty of the people. Infant mortality is generally higher among families of low income groups and the rate decreases with a general improvement in the standard of living. [3]The Director of Public Health initiated an enquiry in Madras, Madura, Coimbatore and Trichinopoly and the results showed that in groups with incomes under Rs. 25, the mortality rate was 120, under Rs. 50, 102, and over Rs. 50, 84.

Maternal mortality

39. The maternal mortality rate for the Province stands again at the very high level of 9·98 per 1,000 live births. Prior to 1928, the maternal mortality rates registered in this Province were too defective for publication and comparison. The following chart shows the maternal mortality rate per 1,000 births from 1928 :—

MATERNAL MORTALITY RATE PER 1,000 BIRTHS FROM 1928.



[1] A plan of Economic Development for India, Part I, 1944, page 11.
[2] Health and Nutrition in India, Professor N. Gangulee, Chapter IV, page 125.
[3] *Ibid.*, pages 126–127.

There has been a steady upward trend in maternal mortality from about 7 to 10 per 1,000 births. How far this rise is due to more complete registration of deaths from maternal causes, it is not possible to say; but a considerable proportion of the registered rise is undoubtedly due to this factor. The maternal mortality rate in this Province is compared below with that of other nations:—

	[1] Maternal mortality rate per mille.		[1] Maternal mortality rate per mille.
Denmark	2·6	Germany	5·1
Norway	2·8	Australia	5·5
England and Wales ..	4·0	United States of America.	8·3
Switzerland	4·4	Japan	2·8
New Zealand	4·8	Madras	8·8
South Africa	4·9		

There is very great need for the adoption of measures for the reduction of deaths associated with child births in this Province. Mostly mal-nutrition is at the bottom of maternal mortality. Recently an investigation was made into the causes of maternal mortality in Madras. The conclusions arrived at in it are of general relevancy and application. The report states that maternal mortality was on the increase, as also the incidence of preventible death. [2] A number of deaths were returned under the head "anaemia of pregnancy" which is a resultant of bad nutrition. The social factors responsible for mortality were also investigated. The investigation showed that one of the most important factors affecting maternal mortality is the spacing of pregnancy. If confinements occur at frequent intervals there is not much time for the mother to recoup between two pregnancies and the risks are increased. Analysing the mortality figures in relation to sanitation as well as size of the house, the report concludes that housing conditions and increased congestion have a bearing on maternal mortality. Investigations were also made of maternal mortality in relation to the general health of the mothers during the time of pregnancy and also of ante-natal care. In many cases inadequate or absence of ante-natal care has been responsible for the mortality.

Registration of vital statistics

40. [3] "Public health activities depend so much on statistics that a high standard of registration is essential if reliable deductions are to be made." The registration of vital statistics in the Presidency began in 1865. Under the orders of the Board of Revenue, village headmen were required to maintain birth and death registers. The registration was not, however, obligatory. In 1899, an Act was passed for the registration of births and deaths in rural areas

[1] Report on an investigation into the causes of maternal mortality in the City of Madras by Dr. A. L. Mudaliyar, page 7.
[2] *Ibid.*, page 13.
[3] Census of India, 1931, Madras, Part I, page 26.

and this has been now extended to practically all parts of the Presidency and registration is compulsory with penalty in case of failure. In municipal areas, the councils are in charge of registration and by the District Municipalities Act, 1920, registration is made compulsory in all municipalities. The compilation of the vital statistics of the Province has been centralized in the office of the Director of Public Health since 1932 and this has contributed to the increasing accuracy of the vital statistics returns. The introduction of the personal register and the posting of the birth and death returns have been helpful in ensuring the punctual receipt of the birth and death reports from the Tahsildars. The enactments referred to above provide from a general point of view ample powers of securing efficient registration. [1] "In practice, however, Madras vital statistics are anything but above cavil." Investigation made into the accuracy of figures collected by village officers revealed wide variations from the correct figures. This was due to neglect or carelessness of these officers to register the vital statistics correctly. Another source of inaccuracy is due to the fact that village officers do not register events at the time of their occurrence; entries are generally written up just before the monthly return has to be submitted. In the submission of returns also there is inordinate delay and actually some returns are not received even at the time of compilation. [2] As correct records of births, deaths and diseases form the basis of all public health activities and are also essential for most other administrative purposes, it is highly important that the work of registration should be done accurately and promptly.

General

41. The position revealed by the birth and death, infant and maternal mortality and epidemic figures may well lead to despondency. Not only does this Province compare unfavourably with the more advanced countries of the world, it also compares unfavourably with many of the other Provinces in India. It is noticed that in the more advanced countries both birth and death rates are generally low. The difference between the birth and death rates which is the net increase is a different thing altogether, a particular rate of increase being consistent with both high and low rates of birth and death. High birth and death rates are therefore an undisputed index of an appalling waste of human material. Progress, however, can come only all along the line, by the building up of a more intensive organization for prophylactic and medical aid, ante-natal education, more and better employment, greater production of wealth and the general increase in living standards that results therefrom.

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[1] Census of India, 1931, Madras, Part I, page 26.
[2] Administration Report of the Director of Public Health, 1944, page 2.

Occupational distribution of population

42. The following table gives the occupational distribution of the people in the Province according to the 1921 and the 1931 census. Figures relating to the 1941 census are not available as they have not been compiled owing to war conditions. This has made the present study of doubtful statistical value as a guide to contemporary trends but it is unlikely that the proportions in the groups or the general trends have varied greatly. Figures between one period and another are not also strictly comparable as the method of classification in the two census has not been uniform. [1] The Census Commissioner himself has remarked that a change in approach might to some extent have affected the allocation of workers to various columns in the two census.

Occupation of population[2]

	1921.	1931.
Pasture and agriculture ..	14,986,910	12,570,439
Fishing and hunting ..	113,972	166,567
Mining	4,208	13,177
Industry	2,215,497	2,288,206
Transport	208,543	294,535
Trade	1,204,109	1,035,043
Public administration and arts	406,690	522,752
Miscellaneous	1,346,744	9,304,702

[3]The census figures show that in Madras out of every 1,000 persons enumerated 445 persons have no work and are dependent for their living on those who work. The remaining 555 people consist wholly of workers or working dependants. Out of the 555 people 270 are dependent on agriculture, 77 on industry, trade and transport, 11 on public administration and 197 on miscellaneous occupations. In the following table is given the number of persons actually dependent on agriculture and industry over a number of years in the Province.

Year.	Agriculture.	Industry including transport and trade.
1881	11,034,503	3,414,495
1891	21,671,578	6,617,889
1901	27,295,036	6,766,654
1911	29,347,072	5,591,058
1921	30,781,678	4,812,771
1931	23,702,261	4,586,731

Among the occupations agriculture is seen to be the most important. In 1921, 71 per cent of the population was dependent on agriculture. In 1931 only 50 per cent are shown as employed

[1] Census of India, 1931, Madras, Part I, page 193.
[2] *Ibid.*, pages 255-258.
[3] *Ibid.*, pages 193-205.

in agriculture but this is due to a system of classification in which non-working dependents have been excluded. There is however little doubt that under the same system of classification the figures would show the same proportionate increase as before. This conclusion is rendered probable by the fact that no new source of employment has been made available in the Province. On the other hand the number employed in industry has actually been going down. Next to agriculture it is the largest single group. In 1901 there were 6,766,654 persons employed in industry. The number fell to less than 5 millions in 1921 and to nearly 4½ millions in 1931. While in the 1931 census the removal of artisans to the non-industrial group has reduced the numbers employed in industry, the fact remains that the general tendency has been for an increasing dependence on agriculture and for the number employed in industries to decline gradually. The increasing dependence on agriculture is also seen from the figures of man : land ratio during the last four decades.

Year.	Man : land ratio.	Cultivated area per head of population.
1911	288	0·78
1921	313	0·79
1931	315	0·78
1941	326	0·69

It is clear from these figures that the gradual increase in the total population has been making itself felt on the land more than anywhere else. Within agriculture, out of every 1,000 persons engaged 429 are agricultural labourers, 390 are cultivating owners, 120 cultivating tenants, 34 non-cultivating owners and 16 non-cultivating tenants. The predominance of agricultural labourers is at once apparent and with the working owners they constitute over 80 per cent of the total number of persons engaged in agriculture. In other words most of the cultivation is still being carried on by owner cultivators. The holdings themselves are so small that the average employed per holding is only two—the owner himself and one labourer there being as many labourers as there are owners or tenants. The evil of absentee landlordism is not as prevalent in this Province as one would suppose. The fact is that it is in the rich deltaic areas that this evil generally persists. This is partly due to the fact that the professional classes that are spread out all over the Province generally come from these areas. Lands in the deltas also offer a more secure source of investment to the outside investor. Absentee landlordism therefore is not on the increase taking the Province as a whole, but is becoming a feature of agriculture in deltaic areas like Tanjore.

There is an improvement in the employment afforded by minor industries due to the growth of several industries connected with service to the population. The transport industry has contributed to a large increase in employment due to the development of road transport. There is a 500 per cent increase in persons concerned

ginneries from February to June are agricultural labourers. A substantial percentage of the labour employed in rice milling areas between January and June is also of this type. This applies also to groundnut decorticating factories. An interesting aspect of migration in search of employment is that in some districts like Malabar the males alone migrate temporarily. From some other districts like Tanjore the migrations are of a more permanent kind.

Migration to other Provinces

45.[1] The following table gives the Madras born enumerated in other Provinces and States in India :—

	1931.		1931.
Mysore	294,024	Bengal	42,437
Bombay	179,457	Bihar and Orissa ..	36,457
Hyderabad	132,952	Central Provinces and Berar ..	12,878
Travancore	104,277	Coorg (1921) ..	22,509
Assam	57,448		
Cochin	54,614		

The migration to other Provinces is partly of the ordinary labour of the coolie type and partly of the lower middle classes such as clerks, stenographers and the like. This latter type has been moving in an increasing measure to Bengal and Bombay. This kind of migration contains in itself both the Malabar and Tanjore features mentioned above, that is, it is temporary but the whole family migrates.

Emigration

46. Emigration from rural parts is one of the prominent factors which affect the rural life in this Province in its social, economic and other aspects. External emigration extends not only to countries nearer India, such as Ceylon, Burma and Malaya but has spread to distant colonies as well. Indians have emigrated to Mauritius, British Guiana, Trinidad, Jamaica, Fiji, Natal, Canada, Australia, New Zealand, East Africa, Uganda, Nyasaland, Caynne, Reunion, St. Croix, Soorinam, Bourbone Island, French Guiana and other places. External emigration is both for skilled and unskilled work. It is either assisted or unassisted. Indian labourers are recruited through agents and sent to the employment areas. This is assisted emigration. Independent of this, there is a strong current which is simply emigration in its natural sense, a movement abroad of people who depart when they like and return when they like. No agency assists their passage or controls their stay in the new country. This is unassisted emigration. Emigration of skilled and unskilled labour outside the limits of India is governed by the provisions of the Indian Emigration Act, 1922. The Act controls the departure of any person from British India who is assisted to emigrate by any person other than a relative. Such departure has been restricted

[1] Census of India, 1931, Madras, Part I, page 79.

to particular ports at which officers called Protectors of Emigrants have been appointed to see to the working of the Act, the proper application of the rules and to afford protection to the emigrants. When the war broke out, there were Protectors of Emigrants at Madras, Negapatam, Tuticorin and Mandapam in this Province. Emigration of unskilled workers out of British India, except in conformity with the provisions of Chapter III of the Indian Emigration Act, and the rules framed thereunder, is prohibited. Emigration of Indians out of British India for the purpose of skilled work is governed by Chapter IV of the Indian Emigration Act.

47. Emigration of unskilled workers to the countries overseas has been gradually stopped. In the last decade there was emigration of unskilled workers only to Malaya and Ceylon. The emigration of unskilled workers to Malaya was stopped in June 1938 and that to Ceylon in August 1939. There is, however, no ban on the regulated emigration of skilled workers to any of the countries overseas. The strength of the Indians in some of the countries to which they have migrated in large numbers, the origin and development of their emigration and the nature of the work attended to by them are briefly narrated below.

48. *Burma.*—Opposite to the eastern coast of India and on the other side of the bay lies Burma. This geographical position has greatly affected rural life in the coastal districts of this Province. Emigration to Burma from this Province was mostly from the coastal districts, as shown below[1] :—

Vizagapatam	63,000	Tanjore	25,000
Godavari	44,000	Ramnad	23,000
Tinnevelly } Malabar }	8,000	Kistna	15,000
		Madura	11,000

The emigration had a profound influence on the Telugu coastal districts as the flow of labour was more from these districts than from others. Emigration from India to Burma dates back to very early times. There was no restriction on emigration, and there were no emigration laws controlling or regulating the flow of emigration to Burma. The emigration of agricultural labour from rural parts was controlled only by the vicissitudes of the season and the agricultural conditions in India and Burma. Most of this emigration was seasonal and from rural parts. The labourers went over in November and returned in April, leaving behind a few who managed to acquire properties and settle down in Burma. After the separation of Burma from India, the immigration of Indians into Burma was sought to be controlled and regulated and an agreement was entered into in 1941. Before the agreement was given effect to, the war broke out. According to the census of 1931, there were 887,000 Indians in Burma and their population had increased at the time of the outbreak of the war. Indians are employed in Burma both in skilled and unskilled work. In the

[1] Census of India, 1931, Madras, Part I, page 82.

year 1931, those employed in skilled work were 12,533 and those in unskilled work were 61,983. In addition to agriculture, they were employed in almost all the factories, industries, mines and refineries, in ports and harbours, in ships and railways. They were also employed in official and domestic services. The agricultural and industrial development and the prosperity of Burma have been greatly assisted by Indian labour. The "Nattukottai Chettis" who are bankers come in as a class by themselves. Many of them have acquired properties in Burma.

49. *Ceylon.*—The country overseas which is nearest to India is Ceylon. The main flow of labourers to Ceylon has been from the Tamil districts which lie near Ceylon. Emigration is largely from the districts of Trichinopoly, Tinnevelly, Ramnad and Salem. Other districts notably, the Arcots, also contribute to the emigration. Emigration to Ceylon is thus mostly a Tamil phenomenon. This dates back to very early times and has gradually increased in volume. Indian emigration to Ceylon is of a special nature "not only by reason of its volume, but also because of the very long historical connections between South India and Ceylon, their share (in spite of marked divergencies) in a common cultural heritage, the strengthening ties of trade and the varied contribution which Indians have made, in the course of many years to the development of Ceylon." The estimated total population of the island at the end of 1938 was 5,864,500. Of these about 800,000 were Indians. The number of Indian labourers and their dependants on estates at the end of the year 1938 was 682,570 made up of 463,473 workers and 219,097 non-workers. The Indians have been regularly resident in Ceylon estates and the probabilities are that nearly a million Madrasis are to be found at any time in the island colony.

50. *Malaya.*—Another country to which Indian labour has been greatly attracted is Malaya. [1] The Indian population in Malaya on 1st April 1931 as given in the Malayan census report was 642,009 of which 582,625 were South Indians, composed of 514,959 Tamils, 32,541 Telugus and 35,125 Malayalis. The percentage of Indian population to the total population was 14·2. Emigration to Malaya is also a Tamil phenomenon, though not so pronounced as in the case of Ceylon. North Arcot, Trichinopoly and Tanjore districts have contributed to half the Indian population. The following is the estimated Indian population in Malaya on the 31st December for each of the years subsequent to 1931 :—

1932	517,000	1936	657,720
1933	515,000	1937	754,849
1934	595,300	1938	743,555
1935	638,714		

Malaya affords employment for Indians in many ways, the main avenues being estates, mines, factories, Government and Public Departments. Indians generally predominate on estates

[1] Census of India, 1931, Madras, Part I, page 87.

and in Government and Public Departments while the Chinese do so in the mines and factories.

51. *Fiji.*—Far beyond Malaya in the Pacific Ocean lie the Fiji Islands. The Indian population at the end of 1934 in Fiji Islands was estimated at 83,289 (48,748 males and 34,541 females). According to Province of origin, it was roughly estimated as follows :—

Madras	..	..	23,500	Doubtful origin ..	4,789
United Province		..	50,500		
Punjab	..	..	2,500		83,289
Gujarati	..	..	2,000		

Of these 72,690 were classified as Hindus, 8,839 Muslims, 973 Christians and 787 of no definite religion. Indians participate in every sphere of the economic life of the colony. Some of the best and most industrious sugar farmers in Fiji are Madrasis. Driving of motor transport for hire is largely a Madrasis' monopoly. The caste system of the home country has been largely abandoned by Fiji Indians.

52. *Trinidad and Jamaica.*—In the Atlantic Ocean adjoining the coast of South America, lie the islands of Trinidad and Jamaica. Indian labourers started to emigrate to these distant islands in the latter half of the last century. At the close of the year 1935 there were 157,976 Indians in Trinidad. It was estimated that Indians owned 120,840 acres of land under cultivation. Many Indian children attend secondary schools in the colony. Indians enjoy the same political rights and privileges as other sections of the population and they follow the same occupations as the rest of the community. Many are landlords, merchants, dairymen, and peasant proprietors, while others are professional men and civil servants. The Indian population in Jamaica at the end of 1937 was estimated at 18,853. The majority of Indians were employed in various manual occupations as agricultural labourers, planters, mechanics, chauffeurs and also as merchants, shopkeepers, gardeners, goldsmiths, cartmen, domestic servants and nurses. A number of Indian men and women held positions as clerks, typists and stenographers. The Indian population who have been born in Jamaica or who have completed 10 years of residence in the Island possess the same political rights as the native population. The report for 1935 shows that Indians owned 9,495½ acres of land of the value of £101,087.

53. *British Guiana.*—This colony forms a portion of the South American Continent on the side of the Atlantic Ocean. The Indian population in the colony at the end of 1937 was estimated at 142,928. Of these 57,176 were residing on the estates. The percentage of Indian population to the total population of the colony was 42·4.

54. *South Africa.*—Emigration of Indian labourers to South Africa began about the year 1861. Indians have settled down in many places in the Union of South Africa. They have settled down

in Natal in large numbers. The Indian population in Natal at the end of 1938 was 176,277 (38,706 men, 28,774 women and 108,797 children). There are many farming on their own account and carrying on other trades.

55. *Mauritius.*—Mauritius is an island in the Indian Ocean, 2,000 miles from Cape Comorin and about 1,000 miles from the African coast. The first settlement of Indians in Mauritius dates back to 1832. The Mauritius population of Madras origin number 1,541 and a major portion is employed in agriculture. The total Indian population on the island at the end of 1937 was 269,329 of whom 30,514 were residing on estates. Under the labour law, all labourers are free to work wherever they like.

Immigration

56. Immigration to Madras is not a very common phenomenon and is not important enough to affect the population. The immigration to the Province is generally of three kinds; those who live very near the frontiers of their Province like Hyderabad and Mysore where the social relations of the people stretch across the border; those who immigrate into the Province for trade purposes like the Gujaratis and others including those from foreign countries; and thirdly those who come back to their motherland, including the progeny born elsewhere of the overseas emigrants. The last is not quite correctly immigration. However, the accretion to population under the first two categories is too negligible to affect the large population of the Province. It is the number coming under the third category that is important. Many people return to their motherland after a lapse of several years. Recently with the war developments in the Far East, those who had emigrated to Burma, Malaya and the far Eastern countries began to return to their native land. Their number increased enormously after the "Pearl Harbour" incident on the 8th December 1941. The Government of India who are charged with the care of all evacuees took a census of the evacuees in India. The census which was enumerated in November and December 1943, showed the total number of Madras immigrants at 130,338. In addition 27,352 people who were born in foreign countries to parents of Madras origin also evacuated and arrived in India making the total immigrants to 157,690. It is expected that many of them will go back now that the war has ended.

57. The main features of the population movement may now be discussed. Seasonal movements of population either towards villages during the transplantation and harvest seasons or towards smaller towns in the non-agricultural season for employment in industries for which the products of agriculture are raw materials are part of the natural economy of the country and are healthy in character. They lead to a distribution of employment which is necessary. The movement of population from the villages to towns in general in search of employment serves to relieve the

pressure on the land and helps in the industrialization of the Province. This also cannot be considered unhealthy. The movement from one Province to another is also of the educated classes that will not fit into agriculture. The drawing of village population to the estates is however of mixed advantage. In so far as it helps to reduce the pressure of population on the soil it has to be welcomed. But very often this population returns to the village in a diseased and emaciated condition and becomes a burden at subsequent periods. The remedy lies not in preventing Indian labour from being absorbed in plantations but in improving the conditions of the labourers in the plantations. The migration of Indians to other countries raises several complicated issues. For one thing it is unlikely that this movement will continue in any large scale in the coming years. Political agitation for self-determination is developing in all the countries and no people are likely to view with favour large masses of cheap Indian labour in their midst. From our own point of view the appellation of 'coolie' which is given to the majority of the Indians abroad is not a thing to be proud of. Measures will have to be taken to provide employment for South Indians in South India itself as far as possible. Several centuries ago India sent out to other countries missionaries, religious leaders, scholars and traders. South Eastern Asia owes its culture to this country. Those who migrate from this country should be professional men, industrialists, traders and the like and not half-starved labourers. To this end there should be adequate development in India itself in all directions so that plenty of employment is created. The position of Indians who have settled down in other countries like South Africa raises numerous complicated problems that do not strictly fall within the purview of this chapter.

CHAPTER III—LAND TENURES IN MADRAS

KINDS OF TENURES

58. [1] "The ownership of land and the nature of rights and obligations as between the members of the rural community arising as a consequence of the utilization of land are, in all countries, the product of a long evolution determined by the geographical, economic, social and political conditions and the circumstances of the community in question." In Madras, the different types of land tenures are to a great extent the by-products of the attempts of the British administration to fix the responsibility for payment of land revenue. The land tenure systems prevalent in Madras are (1) The Zamindari Tenure, (2) The Ryotwari Tenure, (3) The Inams, (4) The Malabar Land Tenures and (5) The Muli Tenure of South Kanara. The two main types are the ryotwari and the zamindari tenures. The total cultivated area under the ryotwari tenure is 27,656,253 acres and under the zamindari tenure 12,842,230 acres.

The Zamindari system

Early history

59. In the Revenue Administration of the old Hindu Rajas, the employment of an intermediary class of proprietors between the sovereign and the subject for revenue collection was unknown. The revenue collection then was directly undertaken by the Government through its village servants, either by taking a share of the produce or by levying a money rent, without the intervention of farmers or zamindars. Intermediaries were introduced by the Muslim rulers when they invaded India in the eleventh century. They occupied the country as a military colony and did not make any attempt to dismiss the old officers who served under the Hindu Kings and replace them by their own staff. The old Hindu system of Revenue Administration involved close and constant supervision and considerable local knowledge which was inconvenient to the Muslim rulers. So they instituted a system of intermediaries who were merely Revenue farmers. During the Hindu period there were officers known as Deshmukhs, Deshpandyas or Collectors. The Muslim rulers found them to be the most suitable persons for the purpose of enforcing revenue demands considering the power and influence they weilded in the country. [2] Therefore these public servants acquired for themselves 'a fixity of office and independence' as Revenue farmers. This paved the way for them to become zamindars and landed proprietors when the British came in. This in essence is the origin of the zamindars. The word "zamindar" means a landholder but in the early stages,

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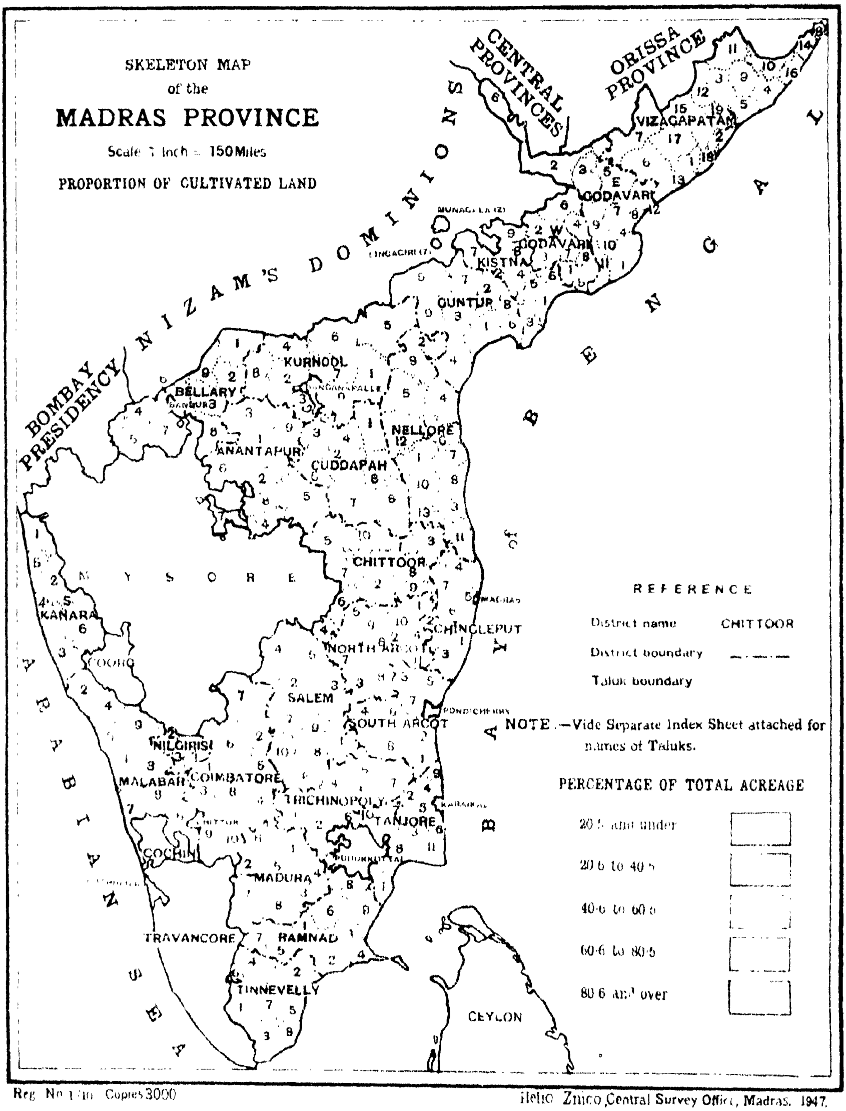
[1] The Indian Rural Problem by Sir Manilal B. Nanavati, Chapter VIII, page 106.
[2] Land Tenures in the Madras Presidency by S. Sundararaja Iyengar, Chapter III, page 54.



Reg. No 1 10 Copies 3000 Helio Zinco, Central Survey Office, Madras. 1947.

the zamindar was only a collector of revenue and he had no title to the lands under his control. His functions were mainly supervision and partial maintenance of order. He gave advances to ryots for cultivation purposes and collected the land revenue due to the Government. For the trouble of collection the zamindar was allowed a " Mallikhana " which amounted to 10 per cent of the collections made by him. Some lands were also allotted to the zamindar, revenue free, and he was allowed to enjoy some other village collections as well. Though this was the arrangement in the early days, gradually the zamindar entered into arrangements with the rulers for the payment of lump sums which was for a year or a term of years. Each time a fresh contract was made, a fresh calculation was made of the income derivable from the lands under his charge and an increased jumma was demanded. The zamindar was not in any sense a local landowner. He was appointed by official warrant which was valid for his lifetime at the pleasure of the ruler. These warrants did not contain anything to indicate grant of any landed rights, nor had he the power to alienate any part of the area. But the power and position of the zamindar naturally grew. In due course the zamindaris became hereditary. There were large areas of waste land attached to each zamindari and they cultivated the same with their own tenants and virtually became owners of such lands. There was also a nucleus of farm lands called private land. The zamindars had also plenty of opportunities to buy lands by getting them in mortgage and seizing properties for arrears of rent. As long as the central power was strong enough to control the activities of the zamindars, they continued merely as officers carrying on their legitimate duties of revenue collection. When after the fall of Aurangazeb, the Mughal Empire began to disintegrate, the zamindars, by reason of their local power and influence, became virtually independent. The successors of Aurangazeb were unable to control the situation, and the zamindars began to assert proprietary right to the soil, and with the further disintegration of the central power, even usurped the administration of justice.

60. In Madras the zamindari system took firm root in the northern circars where the Muslims came in first and where their rule lasted longest. In the southern portions of the Province, lands were held by a class of persons called poligars. [1] These poligars were of three kinds—

(1) The descendants of the royal families of Vizianagaram, Conjeeveram and Madura.

(2) The military chieftains of the sovereigns who had resisted the conquest of the Muslims.

(3) District collectors who had eluded the immediate control of the Muslims and had gradually usurped the sovereignty of the districts.

[1] **Land Tenures in the Madras Presidency by S. Sundararaja Iyengar, page 57.**

The Poliam system was a result of the organization of the kingdom on a feudal basis in 1560 by the founder of the Nayak dynasty. Poliams often comprised a few villages. They are called "Circar" villages or "Polipat." They denote an alienation of the revenue of entire villages in favour of individuals called poligars for feudatory or "kaval" service on a tribute. These alienations were made for assistance rendered or required to be rendered by the poligars in men and money or materials during war. The servants of the poligars who were maintained for external war or internal policing were also assigned lands in proportion to their pay. Practically these poliams were assignments of certain portions of Government revenue of the villages to an individual for a particular purpose in lieu of payment of a salary. There are several poliams in the Province. Kannivadi, Bodinayakanur and Ettayapuram are some of the bigger poliams in the south and Venkatagiri and Kalahasti in the west.

61. When the East India Company took over the administration of the Province during the middle of the eighteenth century, their main anxiety was to make sure of their land revenue. They had to evolve some method out of the chaos existing at that time. They had to acquaint themselves with the descendants and representatives of the old vanquished rulers including the zamindars and the rent farmers through whom the Muslim rulers had been collecting the land revenue. Great abuses were prevalent in the zamindaris, but the zamindars were the only really well-established revenue machinery which remained in existence. It was impossible, taking into account the then existing conditions, to enter into arrangements with the proprietors of the soil over the heads of zamindars. Even if a special staff was set up they could start only after a fresh set of village accounts were prepared. The growth of the zamindar's power had resulted in the complete elimination of the village accountants who were only tools under him and the zamindar always viewed with distaste any enquiry about his village accounts. It had come to a stage when the zamindar was liable to answer only for his contract sum and not for the details of his village collections. The East India Company at that time were deeply interested in making a settlement of the revenues due to their financial needs. Opinion in England was favourable to some kind of a land settlement. The land tax in England had been made permanent by the Land Tax Perpetuation Act, 1798. Representations were also made by zamindars to Parliament by which the East India Company was commended to institute an enquiry into the complaints that had prevailed that Rajas, zamindars and other landholders within the British territories in India had been unjustly deprived of, or compelled to relinquish or abandon their respective lands and to give orders for setting and establishing upon principles of moderation and justice according to laws and constitution of India and to establish permanent rules by which the tributes, rent services of the above should in future be rendered and paid to the Company.

In 1786, when Lord Cornwallis came to India, he came out with instructions to institute a settlement system preferably with the landholders but at the same time to maintain the rights of all descriptions of persons. In 1784 Parliament had passed Act 24 and Lord Cornwallis was to implement its provisions with a permanent settlement of the revenue. The instructions to Lord Cornwallis were specific to the effect that no attempt should be made to upset the existing arrangements and those maxims of policy which prevailed in regulated periods of native Governments. They further directed that the settlements with the zamindars should be made for a period of ten years in the first instance and later made permanent if found suitable after consideration.

The Permanent Settlement

62. Lord Cornwallis, however, dropped the rules for a decennial settlement and sent to the Board for approval proposals for a permanent settlement. The Board agreed and the Permanent Settlement was first introduced in Bengal in 1793. The next step was its extension to the other possessions of the East India Company. A suggestion was made to the Madras Government to introduce the system in this Province but it did not find much favour, except with regard to its application to the Northern Circars where the zamindari system was prevalent. In 1799 orders were received from England that the scheme was to be adopted throughout the Province. Lord Wellesley who had by this time succeeded to the Government of India directed that operations should commence on the lands in the East Coast. A special commission was appointed in 1802 for arranging the settlement of a permanent revenue in those districts which admitted of it, based on the data already available with the local authorities. Regulation XXV of 1802 was passed for carrying out the purposes of the Permanent Settlement. Under the Permanent Settlement, all the zamindars, poligars and other landholders who held claims on estates were confirmed in their respective estates in perpetuity. The Haveli or Crown lands were parcelled out into proprietary estates and thus zamindaris of a new type were created. The parcelled-out estates were sold and their purchasers were given the same status as zamindars. As a result of the settlement, the State's revenue demand was assured. The revenues were regularized and augmented and the method of collection was considerably eased. But the zamindar's social position was undermined. As a result of the Company's policy of taking away from zamindars all the privileges they had enjoyed such as the keeping of a military force and the preservation of law and order, the zamindars were practically stripped of every power excepting such rights as were necessary to be exercised as private proprietors. Several taxes were also expressly excluded from the zamindar's purview. But they got authority to hold the zamindari for ever on a fixed peshkash. The zamindaris were made heritable and transferable. The zamindar got a clean title to the land under his possession and a proprietorship as long as he continued to pay the revenue to the Government,

The assessment fixed at the time of the Permanent Settlement and payable by the zamindar to the Government is called the peshkash. It was arrived at by various methods of calculation and no general rules were followed. The Permanent Settlement in the old zamindaris was successful but many of the newly created estates were unable to stand the strain. The peshkash was heavy and fell into arrears. After the Permanent Settlement the worst sufferer, however, was the ryot. Nowhere were his rights properly and clearly defined. In course of time this resulted in a number of disputes and the relations between the zamindar and the ryot were never cordial. The first dispute arose out of the conferment on the zamindar of the proprietary right to the soil by the Permanent Settlement Regulation. This led to a series of disputes till the right of the soil was conferred on the ryot by the Amending Act of 1822. Another cause of trouble was the uncertainty attached to the amounts of rents payable by the ryots to the zamindars. If the ryot's dues to the zamindar had been definitely fixed at the time of the Permanent Settlement and expressed clearly in unambiguous terms, a great deal of subsequent trouble would have been avoided. [1] " If the two characteristic features, namely, the fixation of the land revenue demand as imperative along with the definite confirmation of the melwaram rights of the ex-Mogul Revenue contractors (zamindars) in respect of the land concerned for the land revenue of which they become liable and also the kudivaram rights of the cultivators, had been maintained uninterruptedly and honestly by the zamindars and the Government, the present economic troubles and the irredeemable indebtedness would not have overtaken the agriculturists of these estates."

The ryot before and after the Permanent Settlement

63. The relation between ryots and landowners in the zamindari areas is one of the most difficult of land problems in Madras and may be examined in greater detail. The condition of the ryots in zamindari areas prior to the institution of the Permanent Settlement is vividly given in the Circuit Committee's Report. [2] " The great abuses existing in the present system, I conceive to arise from the *avarice and inactivity* of the zamindars, who neglected the most principal part of their duty, attention to the people's rights, sell them in fact to interested and oppressive renters." Cultivation therefore, was carried on as a necessity and not due to choice. Cultivators had to pay large contributions to the zamindars for no valuable return and their failure to pay these high demands resulted in compulsory evictions or dispossessions of land. The result was that villages became wretched hovels and tenants did not get even a bare subsistence. Altogether the zamindars did not command the same hold on the people's affections as when the system was first introduced. It was usual to force on cultivators

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[1] **Report of the Madras Estates Land Act Committee, 1938, Part I, page 31.**
[2] ***Ibid.*, page 10.**

many illegitimate demands. Just before harvest the renter over-valued the produce for securing a large and undue proportion to himself and the ryots insisted on a more equitable valuation and even went to the extent of refusing to harvest. But as any delay in harvest resulted only in loss to themselves the ryots were necessarily forced to yield to the renter's demand. When these were satisfied, there were the demands of the peons and servants who forced themselves on the cultivators under various pretences and squeezed something more. The ryots lost all confidence in the zamindars and no power on earth could give them redress. Considerable migration took place but the majority remained and cultivated as they had no alternative means of livelihood. But cultivation on a large scale was abandoned and the ryots had no incentive to cultivate more land than what was just sufficient to meet the tax demand and their needs of bare subsistence. These conditions described in the Circuit Committee's proceedings existed in the zamindaris during the forty-four years of administration by the East India Company prior to the Permanent Settlement of 1802. The main idea of the Permanent Settlement was to ensure to the State a fixed and stable revenue without the necessity of incurring heavy expenses on assessment and collection. Simultaneously the company's solicitude to protect the rights and interests of cultivators was also explained in unequivocal terms. [1]" The key note of the Permanent Settlement was declared to be the emancipation of the cultivators or inhabitants from the tyranny and the oppression of amils, farmers and other officers employed to collect public revenue." The rights to the soil and the rights in other directions were fixed in the same manner as though the ryot was the owner of the land and his only responsibility was the payment of the rent or land revenue due to the zamindar. For the " security and comfort " of the ryots the Patta Regulation was passed as Regulation XXX of 1802, simultaneously with the Permanent Settlement. The Patta Regulation was specifically enacted to protect and safeguard the right of the cultivators. The Regulation was intended, as the preamble stated, to put an end to the indefinite mode of dividing the produce between the under-collectors and the under-tenants and to introduce " determined agreements " in the sharing of the produce. With this end in view pattas were to be executed between the zamindars and ryots. After this agreement was effected it was not open to the zamindars or the Government to enhance the amount of land revenue payable by the cultivators. Provision was also made to settle disputes arising out of these determined agreements. Section 9 provided that in case of disputes, the rates were to be according to those established for lands of the same description and quality as those respecting which the dispute arose. Section 8 was a Penal clause enforcing the execution of pattas within six months

[1] Report of the Madras Estates Land Act Committee, 1938, Part I, page 18.

of the enactment. The only enhancement in the revenue permissible was when waste lands were brought under cultivation. This entailed the giving of a new patta. But a great deal of confusion arose at a later date due to the annual renewals of the pattas. [1] If Regulation XXX had provided one permanent patta for all the land under cultivation at the time of the Permanent Settlement and another for the land that was subsequently brought under cultivation perhaps much of the trouble would have been avoided. It was not, however, easy to divide the two interests of the cultivator for several reasons. . Whatever it was, the effect of this enactment at the time of the Permanent Settlement was to fix for ever the rent of both the cultivated and uncultivated land. Unfortunately this law for the protection of the tenants and cultivators was allowed to become a dead letter. No sooner the Regulation became law, than the zamindars started their campaign to contest the rights conceded to the cultivators under the Regulation. The weak point in the Regulation was the provision that in any case of dispute with regard to rates of rent or right of occupancy, the zamindar could put the cultivator in a court of law and contest the same. This was taken advantage of by the landholders. The power for distraint of the goods of the ryot by the zamindar for rent arrears without going to the court provided for in Regulations XXV and XXX gave the zamindars ample authority to harass the ryots in many ways. The ryots could appeal only to the civil court to get any redress for the abuse of the power of distraint. In course of time the distraint proceedings became very oppressive, and the cultivators found themselves in serious trouble. Simultaneously, the cultivators were also subjected to constant litigation in the law courts by the zamindars to get their proprietary right to the soil declared under Regulation XXV. The zamindars began to deny that the rate of rent was permanently fixed and claimed enhanced rents. Thus very soon after the Permanent Settlement which was partly intended to strengthen the ryots' position, they found themselves in the same predicament as before. The ryots suffered because they had not the wherewithal to fight their case. This situation was remedied somewhat by Regulation V of 1822 by which the Revenue courts of the Collector were authorized to hear cases of arrears of rent.

The failure of the patta Regulation is explained by Mr. C. D. Field in reviewing the landlord-tenant relation in the post-settlement period [2]. It was partially due to the aversion of the ryot to receive the patta and this disinclination on his part was due to his apprehensions that, the rates of payments being reduced to fixed amounts, they would form the basis for future imposition. This was due to a fear on the part of the ryot that if due to disease or loss of cattle or shortage of labour he was unable to bring the

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1 Report of the Madras Estates Land Act Committee, 1938, Part I, page 30.

2 Landholding and the Relation of Landlord and Tenant in various countries by C. D. Field, pages 564-565.

whole land under cultivation, he would still have to pay the dues stipulated in the patta. The loss of crop owing to bad seasons also would bring about the same results. From the ryot's point of view he was justified in his apprehensions at that time, though viewed from present day conditions he might be said to have lost an opportunity.

The Rent Act of 1865

64. The unsettled conditions which arose from the misinterpretation of the Permanent Settlement Regulation by the zamindars and the various courts of law had to be remedied and the rights of the ryot clearly defined. The Board of Revenue in their proceedings of 2nd December 1864 clearly enunciated the position. The Board recorded that the popular assumption, that the ryots pay " rent " to the zamindar as landlord and not as a " tax " due to the State and to the zamindar as the person entitled by law to receive State dues, was fundamentally erroneous. The right of the State was only to a proportional share in the produce of all cultivated land, that is, to a " Tax " on produce and this was never disputed. So when the Government or the person to whom Government had delegated its rights was entitled to only a share in the produce in the form of tax or its equivalent in money, neither the Government nor the zamindar could claim a landlord's right in the soil. The right to a share in the produce was distinct from the landlord's interest in the land. The need to state the Government's position arose out of several judgments in courts which even went to the extent of questioning the occupancy right of the ryot. [1] In 1863, a Zilla judge refused to recognize the right of occupancy of the cultivator and the Permanent Settlement of the rates of rent. It was decided then to introduce a Bill to " consolidate and improve the laws which define the process to be taken in the recovery of rent " and the Rent Recovery Act of 1865 was the result. But when the enactment was finally passed it did not do much good to the ryot. The zamindar was given a veiled right to enhance the revenue or rent due from the ryot, as the Government took power from the same enactment to enhance assessment in the ryotwari areas. The clubbing of the rights of the zamindari ryots and the ryots of the ordinary ryotwari areas created confusion in the minds of jurists which led them to conclude that the Indian landlord was on a par with the English landlord and that the Indian ryot was only a tenant from year to year who could be ejected after due notice at the end of the term. Though this misinterpretation was soon rectified, the field was still fertile for many legal quibbles till the Estates Land Act of 1908 was passed.

The rents in zamindaris continued to be high. In a report on land revenue administration the Board of Revenue remarked [2] " In zamindari areas the rentals are often extremely high as compared with the neighbouring Government assessments owing to

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[1] Report of the Madras Estates Land Act Committee, 1938, Part I, page 73.
[2] Madras Legislative Council Proceedings, 1933, Vol. LXVIII, pages 77-78.

the fact that having been permanently settled in 1802, they either retain the paimash rates similar to those of the Government areas at the period including the now obsolete garden tax or where untramelled by such rates, they are able to make their own bargains with their tenants, or they have commuted the amounts due under the sharing system into money at their own rates. In a zamindari now under the Court of Wards, the Board has found that the highest wet rates are as Rs. 45 per acre, for which, however, the ryot may raise two crops if he can. The garden rates run up to Rs. 15 per acre. These are maximum rates but are actually being paid. The rate payable for betel-leaf garden is fixed at Rs. 32 per acre. The maximum wet rates for Government lands in the three neighbouring districts are Rs. 10, Rs. 8 and Rs. 7-8-0 respectively with the addition of one-half extra when a second crop has been raised. The moderation of Government assessments may be gauged from the figures. In considerable areas in the Godavari delta, good zamindari lands are rented to tenants for growing paddy Rs. 25 to Rs. 30 per acre plus the Government water rate and at much higher rates for sugarcane. The Board is not defending these rentals but they are payable and are being paid."

The Estates Land Act of 1908 and after

65. The Estates Land Act, 1908, was intended to remedy the imperfections noticed in the working of Madras Act VIII of 1865 and to define for the first time the substantive and relative rights and obligations of landholders and their tenants or ryots. The Act secured a permanent right of occupancy to every ryot who at its commencement was in possession of "ryoti" land or who subsequently was admitted to possession of such land. This right was heritable and transferable by sale, gift or otherwise. A ryot could not be ejected from his holding otherwise than in accordance with the provisions of the Act. He might use the land in any manner which did not materially impair its value or render it unfit for agricultural purposes. He had a right to use, enjoy and cut down all trees which were planted by him after the passing of the Act or which naturally grew upon the holding, notwithstanding any custom or contract to the contrary. He had a right to make improvements to his land. As between the landholder and the ryot desiring to make the same improvement, the latter had the preference unless it affected the holding of another ryot under the same landholder, in which case, the landholder had the preference. No enhanced rent could be claimed by the landholder on the ground of the improvement effected by him, unless it had been registered in accordance with the provisions of the Act. The tenant on his part had a right to have evidence of improvements effected by him recorded. When an improvement had been effected at the ryot's sole expense he was not liable to pay a higher rate of rent on account of increased production or of any change in the nature of

the crop raised consequent on such improvement. The Act prohibited landholders from exacting from their ryots anything in addition to the rent lawfully payable and rendered all stipulations and reservations for such additional rent void. The ryot was entitled to a reduction of rent in the circumstances and manner laid down in the Act. He had a right to call upon the landholder to issue a patta and was bound to give him a muchilika in exchange. The Act also conferred certain rights on the landholder. He acquired a first charge for rent and interest thereon not only upon the holding but also upon its produce. He was entitled to reserve mining rights and to receive premium when first admitting any person to possession of ryoti land, to have the improvements effected by him registered and to enhance the rent on certain grounds specified in the Act. He could recover arrears of rent from the ryot by a suit before the Collector, by distraint and sale of the movable property of the defaulter, the growing crops or the produce of the land or trees in the defaulter's holding and by sale of the holding. The Act also provided for a survey to be made and a record of rights to be prepared by the Collector in respect of an estate or a portion thereof in certain cases. Within one year of the passing of the Act, certain defects were noticed in its working and it was amended in 1909. Since then, further amendments were passed from time to time.

66. The question was again taken up by the Congress Government when it took up office in 1937. In accordance with the resolutions passed by the Madras Legislative Council and Assembly in September 1937, a Committee was constituted to enquire into and report on the conditions prevailing in zamindari and other proprietary areas and to recommend any legislation that might be considered desirable. The Committee reported in 1938. In its voluminous report the Committee traced the origin of the zamindars and the rights of tenants from the beginning of the East India Company's administration. The main conclusions of the Committee were—

(i) The zamindars were really rent collectors and the ryots were the real owners of the soil.

(ii) The Permanent Settlement fixed not only the peshkash which the zamindar was to pay to the Government but also the rent which the ryot was to pay to the zamindar.

(iii) In subsequent years the zamindars who were mere tax gatherers receiving a remuneration of about one-third of the tax collected for this service, converted the land tax into rents payable to themselves and enhanced these rents from time to time, also levying at the same time several illegal dues and claiming several rights incidental to ownership of the land.

Accordingly, the Committee recommended:

(i) That the Estates Land Act of 1908 should be replaced as a whole because the changes proposed were fundamental and it was impossible to make any amendments to the Act as it was.

(ii) That a declaration should be made in the new legislation that the rates of land revenue fixed in the year previous to the Permanent Settlement constitute fair and equitable rates of land assessment.

(iii) That permanent pattas with rates of land revenue fixed permanently at the pre-settlement rates should be given to the ryot by the landholder for the whole of the land.

(iv) That it must be declared that the ryot was entitled to enjoy all the natural facilities including grazing of cattle, collection of green manure or wood for agricultural purposes.

The report included a draft Bill embodying the various recommendations of the Committee. The Legislative Assembly after a lengthy debate adopted the general principles of the majority report and recommended the immediate introduction of the Bill to give effect to them. The Bill, however, met with vehement opposition and lapsed when the Congress Ministry resigned.

Ryotwari Tenure and the Land Revenue system

Early History

67. From ancient times the State has always claimed a share of the produce of every cultivated acre, unless it was remitted as a special favour. The ancient laws of Manu mention one-sixth of the gross produce as the land tax due to the king which may be raised to one-fourth in times of invasion or war. The proportion of one-sixth or one-fourth was not always adhered to and it is recorded that the first enhancement was made by the Pandian Kings in 1252. But according to the Aini Akbhari, throughout the whole of the Hindustan where at all times enlightened monarchs have reigned, only one-sixth of the produce was exacted. In the early days, the sharing of the produce offered many advantages. Whatever was produced in the land was heaped on the threshing floor and the king's share was collected in the presence of the king's officers. Thus there was no need for estimates of outturn or remissions. But this could not go on for ever. With the growth of population the task of collecting land revenue in kind became increasingly difficult. The share of the State was ascertained later by estimates of the standing crops. Survey and assessment were first introduced at the time of the Chola Kings. Though generally the assessment consisted of a share of the produce the dry lands were assessed in equivalent of money. Thus for a long time there was no settlement and each year the proceeds were apportioned.

When the State expanded and the population increased, revenue collection in kind became exceedingly difficult and the need was felt to commute it to a money equivalent. The first step in this direction was taken by Timur, one of the early Muslim rulers. The next attempt was made by Sher Shah (1540) but owing to the short period of his rule, the work was not completed. The third and most famous settlement was made under Akbar by his able Finance

Minister Todar Mal. A scientific system of assessment was drafted, taking into account the productive capacity of the soils. The lands were measured and divided into four classes representing various grades of fertility. The State's share was fixed as one-third of the gross produce. The produce was equated to a monetary payment based on the average prices of the produce for 19 years immediately preceding the survey. However, the cultivator had the option to pay in kind if he so desired. The settlement was made annually in the beginning and was subsequently extended to ten years. The principles of assessment under this system did not vary greatly from the fundamentals laid down by the Hindu Kings, except in reducing it to a coherent system. The Mughals, however, are credited with the introduction of regular records and revenue accounts which helped in the gaining of some definite knowledge about the financial resources of the State. The Mughal system was introduced in the Deccan by Aurangazeb and was followed for sometime by successive rulers or deputies till it was abolished by Hyder Ali. Hyder Ali fixed his assessment in "Virarava fanams." This was raised by Tippu by 25 per cent and cultivators were made to pay for all cultivable lands whether actually cultivated or not.

68. Revenue farming was a regular feature in the land revenue systems of ancient days. It was common to divide the districts into large blocks or estates and to calculate a rough sum which the tract would yield and then get some capitalist or landholder to take up the entire management and make him responsible for the revenue payable to the treasury. These Revenue farmers were given wide powers to make effective collections from villages. This system was convenient to the kings and their deputies as the Treasury officers had only to look to the total dues from the different estates. During the period of Muslim rule other circumstances also helped to favour this plan, as for instance the necessity for conciliating the Hindu princes and chiefs. There were a number of small local Hindu Kingdoms, which, though they had succumbed to the Mughals, were capable of giving a great deal of trouble. These Rajahs and their chiefs had a good deal of territorial influence and so the best thing was to leave them to themselves in the enjoyment of their local rule and dignities, provided they agreed to hand over part of their land revenue "as fixed annual tribute or assessment to the treasury." Practically therefore the Rajah became the revenue farmer. The revenue farmers were generally called zamindars or talukdars and neither implied any definite right of ownership in the soil. It only implied that the Raja or other person was looking after the State's right in the land as a 'dependant' of the ruling power. During the beginnings of revenue farming in the Mughal period, the Empire had not reached a stage of dissolution. The zamindar or the revenue farmer was appointed with much form and care, with a written bond of acceptance. The terms of his appointment were specifically described. Usually he

paid to the State nine-tenths of the revenue collections. The office was not hereditary but in the case of territorial chiefs, as the son generally succeeded the father, as a matter of course, the zamindari also was inherited. In other cases the son succeeded only on sufferance and a new warrant was taken out. But as the power of the Mughal rulers declined the zamindars became all powerful and they made the villagers pay whatever they could extract from them.

Early settlement in Madras under the British Government

69. The earliest territory acquired by the East India Company from the revenue point of view was the Chingleput district whose revenues were assigned by the Nawab of the Carnatic to the Company as a contribution towards the expenses of the wars undertaken on his behalf. In the early stages the Company collected the revenue on the native plan. But in 1780, the district was leased out in large farms on nine-year leases. The renters defaulted and the estates were sequestered in 1788. The district was placed in charge of one or two Collectors. Mr. Lionel Place, who was one of the Collectors, restored the ancient village organization as the basis of revenue management, and settled the amount of the Government revenue with the village councils, leaving it to the villages to assess themselves individually. This system was, however, terminated in 1802. Under the orders of the Court of Directors, the districts were divided into estates and each estate was separately assessed and auctioned to the highest bidder.

The next acquisitions of territory by the Company were the Northern Circars which form the present districts of Ganjam (now added to Orissa), Vizagapatam, Godavari, Kistna and Guntur. They were obtained as a grant from the Emperor of Delhi and came under the British administration in 1765. These territories consisted of large estates under the zamindars, or in a few cases, under the native chiefs, whose titles dated from the pre-Muslim period, and Crown lands (Haveli lands) reserved for the support of the Governor of the Province or members of the Royal family and their immediate dependants. The zamindars were left in possession and the Crown lands were leased to revenue farmers for a term of years. To supervise the revenue management, Provincial Councils were formed in 1769 but they were not successful. So a special commission or Committee of Circuit was appointed to tour the districts and institute enquiries into the rights and interests of landlords and zamindars. The Circuit Committee also could not achieve anything due to the non-co-operation of the local councils and renters. For the first time, the Board of Revenue was established in 1786 and individual Collectors took charge in the Circars.

70. At this time in Bengal, plans were getting ready for a permanent settlement of the zamindaris. As a result of pressure, Madras had to follow suit. The Madras Government reported in 1799,

that it was possessed of materials for a permanent zamindari settlement in certain parts of the country. A special commission was appointed and between the years 1802 and 1804, the Northern Circars were permanently assessed. The lands already in the hands of zamindars were confirmed to them in perpetuity, the assessment or peshkash being fixed at two-thirds of half the gross produce estimated on an average of the previous thirteen years. In other words, half the total produce was to be left to the cultivator, one-sixth was appropriated to the zamindar and the remainder, which was two-sixths or one-third, was the Government revenue. No increase was leviable on account of extension of cultivation to waste lands. The Haveli or Crown lands were parcelled out into estates of convenient size, assessed in a similar manner and sold as permanently settled revenue farms to the highest auction bidder. Regulation XXV of 1802 detailed the terms on which the estates were held. Many of these artificially created estates came back to the Government owing to the incapacity of the bidders to pay the peshkash and as there were none to re-purchase them, they became temporarily settled estates. Though a number of zamindaris were sold for arrears of revenue, purchasers were found for them in due course and they did not cease to be permanently settled. Only in a few cases there were no purchasers and those lands were retained by Government as " Khas Mahals ".

While these measures for the settlement of the Circars were in progress, new territories got added to the Province in the south and the question of the assessment of those lands came up for discussion. In 1792, as an outcome of the first war with Tippu Sultan, a considerable tract of the country comprising the present districts of Salem, Malabar and part of Madura came into the hands of the East India Company. The second war added Kanara and Coimbatore. As a consequence of the treaty of 1800 with the Nizam of Hyderabad, the Bellary, Anantapur, Kurnool and Cuddapah districts were ceded in perpetuity. In 1801, the remaining possessions of the Nawab of Arcot in the Carnatic, comprising the present districts of Nellore, North and South Arcot, Chittoor, Madura, Ramnad, Trichinopoly and Tinnevelly were made over to the British. In 1799, the Tanjore district had already been brought under British management owing to the incapacity of the Hindu Ruler. In these newly acquired territories, the same distinction was found as in Northern Circars. There were lands held by numerous chieftains called poligars and also lands held direct from the Government.

71. A beginning was made to settle these new districts in 1798. Captain Read was sent to Baramahal, as the Salem district was then called. Coimbatore was taken up in 1799 and the Ceded Districts by Munro in 1801. The Carnatics were settled on similar general principles immediately afterwards. All these early arrangements were tentative and depended largely on what the settlement officers found practicable. Captain Read was instructed to grant

leases to the headmen or chief inhabitants of each village. One or more individuals were to be selected to hold the settlement and to pay, according to the terms of the lease, the amount which might be fixed as the revenue of the village. At the outset, it was intended that the leases should be annual and after sufficient information had been collected, for five years. Accordingly Captain Read offered terms to the headmen of single villages on the basis of the recorded assessment in Hyder's reign with corrections made by reference to actual cultivation. The interests of the cultivator were protected by making a detailed field survey. This naturally led to the idea of assessing each field according to its quality with freedom for the cultivator to keep the field or to relinquish it and take another. The survey and assessment of each field were completed by 1798 and a proclamation was issued setting forth the terms of the settlement, the main condition being that all the resident cultivators in a village should be collectively responsible for the revenue due on all the lands cultivated during the year. This, however, was not the kind of arrangement which the Board had intended to make and with the calling away of Captain Read for the second Mysore War, the Salem district was divided in 1803–1805 into numerous revenue farms which were sold in auction to the highest bidder as an extension of the Permanent Settlement. But this arrangement failed and many estates fell into the possession of the Government. It became clear to the Board that the Permanent Settlement could not be carried out and this resulted in a "come back" to the Read's system, which was in fact, a Ryotwari Settlement, i.e., a settlement with each individual cultivator. Economy and a desire to introduce a plan of settlement approximating to the Zamindari Settlement in perpetuity were always strong with the Board and they again attempted to partially revert to that settlement in 1808 by introducing a system of village leases in the districts where Permanent Settlement had not been established and in which settlements were made with the individual cultivators. Under the "village lease" system, the settlement was to be made with the village headmen or with the general body of villagers or failing them with a renter. The revenue due to the Government was to be assessed on the average of the amount collected from the village in previous years. In the first instance, the leases were for a period of three years and later, for ten years. The difference between this and the ryotwari system was that under the latter, the cultivators were at liberty to extend or curtail their holdings and were only responsible for the payment of the revenue assessed on the fields actually held by them. Under the village lease system, the ryot had no power of relinquishing any portion of his holding during the currency of the lease. The experiment was not successful and the cause of failure was over-assessment. Lessees could not be found for many of the villages and in them the ryotwari system continued. In 1817, the Court of Directors issued instructions for the abolition of the village lease system and the ryotwari system was reintroduced wherever

practicable. The position at that time was that the zamindari system was in force in the districts of Ganjam, Vizagapatam, Godavari, Kistna, Guntur, Salem and Chingleput in the permanently settled estates of the poligars in parts of the Ceded Districts, Nellore, North and South Arcot, Chittoor (excepting a portion), Madura, Ramnad and Tinnevelly. In the unsettled portions of the latter districts and in Tanjore and Trichinopoly, the village lease system prevailed. In Coimbatore, Malabar and Kanara, a class of landlords was found whose claims were so far recognized as to enable them to retain a share of the produce. By 1820, all these gradually disappeared when Munro became the Governor of Madras and took up the final establishment of the ryotwari system.

The Ryotwari Settlement

72. Ryotwari Settlement means the division of all arable land, whether cultivated or not into 'fields' and the assessment of each field at a fixed rate for a term of years. The field is generally an arbitrary area. It has no minimum size, but it is usual to fix a maximum which is at present 5 acres in wet and 10 acres in dry land. Where a survey field comprises the holdings of two or more occupants, it is subdivided to distinguish portions transferred or relinquished. The occupant pays the revenue so assessed on the area he actually occupies. This area may be constant or may vary from year to year with the relinquishment of old fields and the taking up of new ones. The occupant deals directly with the Government and is responsible only for his own holding. He is given a document called a patta, which sets forth the extent and assessment of each survey field or portion of a field in his occupation. This patta is liable to revision every year to bring it up to date. The occupant thus enjoys all the advantages of proprietorship, subject only to the payment of the revenue due on the lands held during the year. The lands can be inherited, or burdened for debt in precisely the same manner as a proprietary right, provided that the person in whose name the land is registered in the Government accounts pays the revenue due to the State.

Though the Ryotwari System was attempted to be established as early as 1820, the scheme was not initially a great success. In 1855, that is, a quarter of a century after the principles of the ryotwari system had been adopted, it was found that less than one-fifth of the area of the Province was cultivated, while more than half the area recorded as arable remained waste. The increase in population and the uninterrupted peace did not bring about any extension of cultivation. The incidence of assessment was unequal everywhere and a succession of years of low prices increased the burden of the rates. The Government's share was estimated at 50 per cent of the gross produce from irrigated land and 35 per cent from dry land as against a share of 25 to 30 per cent which was the utmost that could have been claimed in order to give the ryot a proprietary interest in the land and to induce him to extend

cultivation. Moreover, in Madras at that time no regular survey had been instituted and the early surveys were defective and plans were available for only a few districts of the Province. Taking all these into consideration, it was decided in 1855 that a general revision of assessments should be made throughout the Presidency, founded on an accurate survey and classification of soils and with this end in view the Settlement Department was constituted in 1858.

73. The original idea of the founders of the ryotwari system was to make the assessment on land permanent as in the case of the Permanent Settlement of zamindaris. Both Col. Read and Sir Thomas Munro declared at the time of their proclamation that " the assessment was fixed for ever." The Famine Commission of 1860 also made a proposal to extend the Permanent Settlement of land revenue to all parts of India and this was circulated for opinion to all local Governments. In 1862 the Madras Government explained clearly that " the leading characteristic of ryotwari tenure is the permanency of the assessment." The same view had been expressed by the Board of Revenue earlier in 1857. In 1862, Sir Charles Wood, the then Secretary of State for India, ordered that " a full, fair and equitable rent " must be imposed on all lands under a temporary settlement. The Government were given the option to decide how far a particular tract had reached the stage for the practical application of the measure. In 1865 he laid down the rules for the introduction of the settlement. The districts were divided into the following three classes :—

(*a*) districts in which agriculture was backward,

(*b*) districts in which estates were fairly cultivated and resources fully developed, and

(*c*) districts which contained estates fairly cultivated and also estates with resources imperfectly developed.

It was decided to introduce the perpetual settlement in the second class of districts. The first category of areas was not to be permanently settled. In the third category perpetual settlement was to be introduced for all estates in which the actual cultivation amounted to 80 per cent of the cultivable area and estates not so cultivated were to be settled only for 30 years. The principle of perpetuity was adhered to by succeeding Secretaries of State, Earl Grey, Ripon and Sir Northcote. However, another qualifying clause was added to the areas for temporary settlement, viz., those areas where irrigation was likely to be extended within the next 20 years whereby the assets might be increased considerably. Before effect could be given to these rulings a change of view had come upon the authorities in England arising from the loss of prospective income to the State. So when the Madras Government applied for the orders of the Secretary of State to declare the grain valuations of the Settlement Department permanent, he refused his sanction on the plea that it involved an unjustifiable sacrifice of the future resources of the State. So the idea of a perpetual settlement was dropped and the Secretary of

State in March 1883 finally ordered that the policy laid down in 1862 for a perpetual settlement should be formally abandoned. Finally the Government closed the matter with the following communiqué issued on 28th March 1883. " Save for an unauthorized proclamation issued by the Settlement Officer in Salem district over 100 years ago, no declaration has been made to the people binding the Government to any Permanent Settlement. During the discussions which attended the introduction and gradual evolution of the Ryotwari Settlement, opinions were recorded in some cases by highly paid officers of Government in favour of the eventual permanency of the settlement, and so late as 1862 a guarded adherence to this view was expressed by the Secretary of State. But whatever weight might have been attached to these views at that time, they remained mere expressions of opinions as to the future policy of the Government, and were never given practical effect to or adopted as a principle for immediate adoption."

The Scheme of Survey and Settlement

74. The Settlement Department first demarcated the village and field boundaries after a tedious process of investigation and arbitration of disputes. The process went on slowly and a few districts were completed by 1864. Due to the unsatisfactory progress of the settlement operations, the Government in 1864 resolved to place all settlement operations with Collectors under the Board of Revenue and the new system was introduced in the two districts of Tinnevelly and Nellore. But this system again proved a failure and so the operations continued everywhere except in Tinnevelly under the special department till the end of 1873. In the 15 years of the existence of the department, the settlement of the whole of the Trichinopoly, Kistna, Guntur, Godavari, Nellore and Salem districts and of parts of South Arcot, Kurnool, Cuddapah and Tinnevelly had been completed. The area settled extended to 27,892 square miles at a cost of Rs. 42,84,775. There were 26,146 square miles more to be settled and the time required was estimated at 13 or 14 years and it was decided to continue the department. In 1879 financial exigencies resulted in the amalgamation of the department with the Board of Revenue. In 1882 the department was revived. But with the reorganization of the Board of Revenue in 1887, the department was again placed under the Board and continued so till it was abolished in 1937.

The original scheme of survey and settlement was based on the following principles :—

(1) the survey should show all the principal variations in the surface of the soil as hills, jungles, roads, channels, tanks, topes, houses, cultivable lands, and also exhibit accurately the sizes of the fields in these last two classes of land;

(2) the minimum size of fields was to be one acre of wet and two acres of dry land; interstitial holdings were to be treated as subdivisions of such fields;

(3) permanent boundary marks were to be established and field, village and taluk maps prepared;

(4) assessment was to be ryotwari;

(5) soils were to be divided into a few classes based on differences of composition;

(6) the Settlement Officer was to estimate, as nearly as possible, the productive power of the land, stated in quantities of some one of the ordinary grain crops, paddy for irrigated lands, and cumbu, cholam or some other grain for unirrigated. These estimates (grain outturns) were to form the basis of the ultimate assessment; they were to be carefully made on such a scale as would allow for indifferent crops and bad seasons;

(7) the land was then to be valued with regard to nearness of village roads, markets, and irrigation facilities, and the field or village was to be classed accordingly;

(8) the assessment was to be moderate; the then existing rates were generally based on 50 per cent of the gross produce for wet and 33 per cent for dry lands; Sir Thomas Munro's maximum was 30 per cent, and this was adopted on the assumption that the average assessment would be about 25 per cent of the gross produce;

(9) the assessment was to be varied every 7 or 10 years with the commutation price of the standard crop, to be calculated on the average of the prices prevailing during the previous 7 or 10 years;

(10) it was not necessary to divide the country for the purpose of official scales of prices, i.e., one scale was to apply to the entire Province for the term adopted; but this principle was abandoned in practice and the commutation prices for each district came to be calculated independently;

(11) the grain outturns were to be unalterable for a period of 50 years;

(12) it was to be open to the ryot to compound for a fixed annual payment for a term of years; and

(13) the Survey Department and the Settlement Department were to be separate, under a Surveyor-General, and a Superintendent of Settlement, respectively.

This scheme was accepted in the main by the Court of Directors. Objections taken subsequently with regard to certain detailed points were decided at different times in respect of the following:—

(1) the restriction as to the size of fields was removed; the maximum was once fixed at 2 acres for wet and 4 acres for dry land, but now, as a rule, each revenue field (i.e., each parcel of land on which previously a separate assessment was fixed) will form a survey field; in exceptional cases two or more revenue fields may be clubbed together subject to the following conditions—

(*a*) every survey field so formed must consist of entire revenue fields;

(*b*) no survey field so united should exceed 5 acres of wet or 10 acres of dry land;

(*c*) the revenue fields forming a survey field should be held on the same tenure; inam and ryotwari land should not be taken together;

(*d*) no existing revenue field, however large, should necessarily be divided;

(2) the assessment was to be made on the net produce, i.e., after deducting the expenses of cultivation and a percentage for vicissitudes of season, and unprofitable areas;

(3) the term of settlement was to be 30 years, i.e., both grain outturns and commutation prices were to remain unalterable for that period; subsequently it was decided that at each settlement or resettlement of a district, the Government would fix at their discretion the period for which such settlement or resettlement should be in force, and on the expiry of that period they would revise the assessment in such manner as might then seem just and proper either with reference solely to a rise or fall in prices or with reference also to other considerations such as would require a reclassification of soils or a recalculation of the grain outturns;

(4) Lease for a term of years at reduced rents was found to be unnecessary for the encouragement of large holdings;

(5) Another important question which came up for disposal at the time of the initial settlement of the districts of Godavari, Kistna and Guntur was the method to be adopted in assessing the additional amount to be paid, over and above the land assessment, for water supplied from Government irrigation sources such as the Godavari and Kistna canals. In these districts it was decided to impose a uniform charge of Rs. 4 per acre for irrigation supplied for a single crop, in addition to the land assessment, which was determined as if the land was unirrigated. It was desired to adopt a similar plan in all other districts when practicable. As a matter of fact, however, the only other district in which the system has been introduced is Kurnool, in some parts of which irrigation is supplied from a canal which was originally worked by the Madras Irrigation Canal Company under a guarantee from the Government, and the principle was maintained when the company's works were taken over by Government. In districts subsequently settled, the assessment on irrigated lands was determined by a consideration of the value of the paddy (rice) crop grown on the best irrigated land, gradations of rates being formed to meet the conditions of inferior qualities of soil or defects in the sufficiency or regularity of the water-supply; this system of consolidated wet assessment was extended to the irrigated lands under the Godavari, Kistna and Kurnool-Cuddapah canals at the re-settlements of those districts; and

(6) Formerly, it was the practice to charge the rates settled for irrigated lands on lands irrigated by wells, where such wells were situated within a distance of ten yards of a Government source of irrigation although the Government had incurred no expense

in sinking the wells; the justification for this source was that the wells derived their water-supply by percolation from the Government source; under recent orders, however, such lands are no longer assessed as irrigated and the cultivator is allowed to enjoy the benefit of irrigation from his well free of any additional charge.

Procedure of settlement

75. *Preliminary.*—The detailed operations performed by the Settlement Department in effecting the settlement of a district are as follows :—In the first instance a general view of the district is obtained. Particulars of climate, rainfall, physical features of the different tracts or divisions, information relating to its past history, its years of plenty or famine, its land tenures, mode of taxation and the causes of gradual progress are obtained from the Collector's records. The relative values of such sources of irrigation as the various tracts possess are estimated. A general idea of the prevailing soils is obtained and at the same time information is gathered as to how different tracts are affected by roads, canals, markets, towns and sea port. The methods of cultivation, the crops grown, marketing methods adopted and the wages of agricultural labourers are also enquired into.

Classification of soils.—Mr. Newill, the first Director of Settlement divided the soils into five series as follows :—

(1) The alluvial and exceptional, which includes the rich soils in the deltas of the great rivers, garden and other soils, permanently improved by long working.

(2) The regar or black cotton soil.

(3) The red ferruginous soil.

(4) The Calcareous soil, originating from underground strata of chalk or lime.

(5) The Arenaceous soil (more or less pure sand on the sea coast).

These were adopted as they answered the requirements of being few in number, simple and well defined and accepted by the local people.

76. Among each series there may be different variations depending on their admixture with other constituents like clay or sand in varying proportions. So each series is divided into classes, the exceptional into two, alluvial and permanently improved; the others into three, each known as "clayey", "loamy" and "sandy". The clayey soils of each series are those containing more than two-thirds clay, the "loamy" soils with one-third to two-thirds clay and the rest sand and the sandy soils with more than two-thirds sand. In these groupings allowances are made for the presence of deleterious substances which affect fertility, by subdividing each class into sorts according as the soil is "good", "bad", and "ordinary". At first the number of sorts in a class was only two but experience proved such a scale to be too inelastic and the number was increased first to three and then to five,

namely, best,-good, ordinary, inferior, and worst. In determining the classification the soil is turned up to a depth of about 9 inches. One yard is considered to be the proper depth for the surface soil, and if it is less than this, the actual depth is noted as well as the nature of the sub-soil. The classification of each field is noted on a village map and in a register. For irrigated lands the classification is still more elaborate, because these lands are again subdivided into a number of groups according to the nature and efficiency of the sources of irrigation from which the lands derive their supply of water and lands falling under each of these groups are classed under the various varieties of soil. The classification of soils is indicated in the following table :—

Series of soils.	Classes.	Sorts.
1. Alluvial and exceptional	(a) alluvial, and (b) permanently improved.	(a) best, (b) good, (c) ordinary, (d) inferior, and (e) worst.
2. Regar or black cotton 3. Red ferruginous 4. Calcareous 5. Arenaceous	(a) clayey, (b) loamy, and (c) sandy	

Grain outturn.—The second step is to ascertain the grain outturn from each class of soil. The same kind of crop is not always grown on the same soil nor on the same field from year to year. It is therefore necessary to choose one or more standard grains to represent the general or average produce. The crop most extensively grown on irrigated lands is paddy. On dry lands several varieties of food-grains are grown and the crop cultivated on the largest area according to the cultivation accounts is usually selected as the standard, or more often two crops are taken, the areas under other crops being presumed for settlement purposes to be cultivated with one or other of these according to the relative value of the crop. A fair average outturn of the standard grain is then ascertained per acre of each class and sort of soil and this is called the "grain outturn." The criterion of such outturns is experience, and this is sought in experiments by the officers of the settlement and agricultural departments, in the knowledge acquired during long years of service by Tahsildars and similar officers of the Government, in the records of produce entered in the old village accounts and in the admissions of ryots. The actual experiments consist in reaping, threshing and measuring the crop upon small areas in selected fields. The number of such crop-cutting experiments per district has exceeded several thousands.

77. *The commutation price and cost of cultivation.*—The grain outturns are next commuted into money. The commutation price is fixed on an average of the prices for a long series of years, so as to ensure that the advantages of good and disadvantages of bad years may be balanced. Fifteen per cent is then allowed for marketing charges. For the earlier settlements, the averages taken were based on the prices of the 20 years from 1845 to 1864. But since 1885, the period has been altered into twenty non-famine years

immediately preceding each settlement. From the results obtained by applying the commutation rate a deduction of 1/16 to ¼ is usually allowed on account of vicissitudes of season and for the fact that the survey areas or fields include small extents of uncropped land, such as irrigation channels. Against the average value of the produce thus determined has to be set off the cost of cultivation, the estimation of which is the most difficult and the most conjectural of the various steps in connection with the settlement. The cultivation expenses are computed and these are deducted from the value of the total outturn. This gives the net produce and half of this or rather less than half is taken as Government demand. The straw is usually taken as a set off against the item "feed of bullocks".

For purposes of simplicity and to avoid multiplication of rates, the classes and sorts of soil which have been found by experience to yield alike or very nearly so, are arranged in grades called "tarams". The values of half the net produce of the different classes and sorts of soil falling in the same grade are very nearly equal. Only one rate of assessment is therefore paid for each grade and their rates are adjusted so that the descent from the highest to the lowest may be by a uniform amount in each grade. As soils possess different productive powers when irrigated and dry, two scales of "tarams" are adopted. A third scale of rates is adopted for the garden lands of Malabar and South Kanara. Proximity to markets, and communication facilities are all taken into consideration and villages are arranged in groups generally two or three for a district, according to circumstances. The irrigation sources are also arranged in classes according to the nature of the water-supply and the assessments are correlated taking all these factors into account. As a result there are 89 rates in the wet scale ranging from As. 12 to Rs. 15 per acre and 61 in the dry varying from As. 2 to Rs. 11 per acre. In Malabar there are 7 garden rates ranging from Re. 1 to Rs. 7 per acre.

78. *Settlement register and pattas.*—The final accounts after settlement are entered in the settlement register, which is the foundation of the whole revenue administration. It contains information regarding every holding large or small. From the register a ledger is prepared which gives the personal account of each ryot with the Government. A copy of the personal account is also given to the ryot which is the "patta". The introduction of settlement is effected by the issue of pattas to those entitled to them and this is one of the most important parts of the process of settlement. The pattas are issued to the rightful owners of the lands. On an average a district consists of over a million fields with over a lakh and a half of ryots. The interval between settlement and resettlement is 30 years. During that period neither the grain outturns nor the commutation rates are altered. But under the ryotwari system each cultivator is free to hold or relinquish whatever fields

he likes, or to take up other available fields. Deductions have sometimes to be made from the total assessment. There must be therefore an annual settling up of accounts with the ryot. This is called the annual jamabandi. This enables the settlement registers to be corrected and kept up to date. The assessments in the various districts of the Province were revised from 1862 to 1898. Malabar and South Kanara were the last to be dealt with. Throughout this period of the initial settlements, prices were steadily rising and consequently the assessments, even though based on the prices of 20 non-famine years previous to the year of settlement, were higher than the rates they replaced. The settlements were for 30 years and as each settlement expired the question of its revision was taken up. Resettlement consists in a revision of the rates of assessment based on change in prices, means of communication, accessibility to markets and in the improvement in the quality of irrigation sources since the original settlement. As a rule the rates are raised or lowered all round in defined tracts by the same percentage. The main economic factor has been the continuous rise in prices, excluding famine years, since the original settlement. Therefore resettlement in practice has meant an increase in assessment.

79. *Recent changes in Land Revenue Policy.*—Beginning from this century, resettlement operations were carried on from time to time in the districts where the 30-year period had been specified, and enhancements of land assessment were made. The percentage enhancements were generally between 9 and 25. Such enhancements were regulated by executive rules and evoked strong public feeling. In their report on the Government of India Bill in 1918, the Joint Select Committee recommended legislation embodying the main principles on which the assessment of these lands should be based. Since the introduction of the Montford Reforms, the demand for such legislation became insistent. A draft Bill was prepared by the Board of Revenue in 1921 and was examined by a committee of officials and non-officials. In 1924 this Bill was introduced in the Legislative Council with a new clause, to the effect that the increase in the rate proposed at resettlement should not exceed 18¾ per cent of the previous rate. The Bill was, however, rejected by the Council at the first reading and the proposal to limit the percentage enhancement to 18¾ per cent did not therefore become law. But on a review of the position the Government decided that in future resettlement enhancement of rates on the basis of rise in prices only should not exceed 18¾ per cent. This decision was given retrospective effect in respect of the resettlement enhancements previously made in the districts of Tanjore, Bellary and Anantapur (black soil area). After 1930 the economic depression increased the burden of the land tax and the Government had to order suspensions and later remissions of the enhancements. In 1937, the Government ordered that no resettlement operations should be initiated, and that those already in progress should be suspended, excepting those which were carried

on for purposes other than reassessment. In the same year, in order to reduce the burden of the land tax, the Government proposed to introduce a Bill to fix standard rates of assessment payable on land and to make those rates unalterable except by a vote of the Legislature. For this purpose the ryotwari tracts were grouped under three heads. The first group included tracts in respect of which the prices prevailing over a number of years subsequent to 1904–05 (the year in which the abnormal rise in prices started) entered into the calculation of the resettlement commutation rates. The standard rates for those tracts were to be the then current rates of assessment reduced by the entire percentage enhancement at the last resettlement. The second group included tracts in respect of which the prices of only a few years immediately succeeding 1904–05, i.e., up to 1908–09 entered into the calculation of the resettlement commutation rates. The standard rates of assessments in those tracts were to be the current rates of assessment reduced by one-half of the percentage enhancement imposed at the last resettlement. The third group comprised tracts not included in the first two groups and the rates of assessment there were to continue at the current rates without any reduction. The Bill was not proceeded with as the Congress Ministry resigned.

The inam tenure

80. " Inams " are beneficial tenures and are traceable to remote antiquity in India. During the time of the Hindu rulers it was the custom to grant assignments of land revenue free or at low quit-rents for all kinds of purposes like payment to troops, civil officers, maintenance and support of temples and their servants, charitable institutions and rewards for public service. The Muslim rulers also continued this custom of granting beneficial tenures for various purposes. These assignments were called jagirs. The jagirs, however, reverted to the State on the death of the grantee, unless renewed by a new grant, as it was the established policy of the Muslim rulers not to alienate the rights of the Government in the soil in perpetuity. The only exceptions were when lands were alienated for religious endowments and as grants to holy men and celebrated scholars. These were called milk grants which gave perpetual title to the grantee. During the early period of the East India Company rule, the Government of the day, following the custom of the country, adopted the practice of rewarding meritorious service by grants of jagirs. The custom gradually fell into disuse under instructions from the Court of Directors in 1829, who directed that money pensions should be preferred to grants of land on all ordinary occasions and that grants of land should be made only under special circumstances.

The total area under inams in this Province is 6,872,896 acres. These inams or manyams are in hereditary and perpetual occupation. Whenever a ruler made a grant of land he gave a deed evidencing it, which contained particulars of the donor's genealogy, the description and nature of the grant, the people or person on

whom it was conferred, the objects for which the grant was made, and the conditions of the grant. The deed also contained the imprecations on violators of the grant and was properly witnessed. These were generally engraved on copper plates or slabs of stone. In the earlier periods these grants were made by the sovereign only, but towards the end of the Mughal period when the central authority disintegrated, various petty chiefs assumed the power of granting beneficial tenures for numerous miscellaneous purposes. Inams were obtained even by collusion with Revenue officers.

Kinds of inams

81. Inams are found scattered in ryotwari as well as in zamindari areas.

[1] There are three types of inams in the zamindaris of this Province, the excluded inams, post-settlement inams and included inams. The excluded inams are those inams excluded from the assessments of the zamindaris during the time of the Permanent Settlement, under section 4 of Regulation XXV of 1802. The post-settlement inams are those created by the landholders after the Permanent Settlement. They are considered invalid under sections 4 and 12 of the Permanent Settlement Regulation. Even if they were considered valid, it was limited to the lifetime of the grantee. The last is the " Included " inams. These inams were taken into the assets of the zamindari during the Permanent Settlement. They formed part of the Permanent Settlement. When the Permanent Settlement Regulation was passed in 1802, the first step taken was to exclude the inamdars from the scope of that regulation and base their title on actual possession. Regulation XXXI of 1802 was passed simultaneously which covered these inams. This regulation provided for the investigation of the title of the inamdars and other similar grantees, and their liability to pay any revenue to Government, and for the fixing of the amount payable. The preamble to the regulation declared that in conformity with ancient usages, the Government reserved to itself the actual proprietary right of lands of every description and that any alienations effected without the consent and authority of the Government were violations of that right. It added that those who had made such unauthorized encroachments, colluding with local officers, would have their titles ascertained. [2] According to clause 2 of the regulation all grants of land exempt from payment of revenue and made previous to the following dates were held to be valid, provided the then incumbents or their ancestors had obtained and held actual possession of the said lands and jagirs :—

(1) In the Northern Circars prior to 26th February 1768.

(2) In the Carnatic and Tanjore prior to 12th July 1792.

(3) In Baramahal, Salem, Dindigul and Malabar prior to 18th March 1792.

(4) In the Ceded Districts prior to 12th October 1800.

[1] Report of the Madras Estates Land Act Committee, 1938, Part I, pages 185–186.

[2] *Ibid.*, page 198.

Though provision was made for the validation of the inams in clauses 2 and 3 of Regulation XXXI of 1802, no action was taken for a long time to investigate the titles. The necessity for the investigation arose only at the time of the settlement of the ryotwari lands when it was necessary to exempt these inam lands from assessment. In 1858 an Inam Commissioner was appointed to investigate into inam titles and grant title deeds. But between 1802 and 1858, a number of disputes had arisen. Inams granted for special purposes were not utilized for the purposes for which they had been granted. It was necessary to prevent such misuse, and Regulation IV of 1831 was passed which prohibited such misuse and Regulation XXXI of 1836 extended the provisions of this enactment to the grants made by earlier rulers or native Governments. The Inam Commissioner compiled an inam register. As a result of various enquiries, the inams were classified as follows :—

(1) Those held for the support of religious institutions and for services connected therewith,

(2) those held for the purpose of public utility,

(3) those held for the support of works of irrigation yielding public revenue,

(4) those held by Brahmans and other religious classes for their personal benefit,

(5) those held by the families of poligars and those who filled hereditary offices under former Governments,

(6) those held by the kinsmen, dependants and followers of former poligars and zamindars,

(7) those held by persons connected with the former general police of the country,

(8) those held for village revenue and police service, and

(9) those held by artisans of various descriptions for services due to village communities.

82. After the appointment of the Inam Commissioner in 1858 the Board of Revenue issued a rule regarding the basis for the investigation of the inams. It stipulated that the inamdars should have been in possession of the inam for a period of 50 years before 1858 to constitute a valid title. Thus the principle of the inam settlement was " long possession ". Long possession both afforded an evidence of right and also constituted a motive for the Government not to interfere. In the conversion of the various imperfect inam tenures the rate of commutation was fixed with reference to the benefits conferred. In a minute Sir Charles Trevelyan stated that " when a family has for two generations bought and sold and borrowed and lent and married and brought up children to a certain position in society, on the strength of the possession of a particular estate, I can conceive no stronger title in reason or equity to the property of that estate. I therefore propose that when it shall be

provided that land has been in the possession of a person for fifty years without the payment of land-tax, such length of possession shall be held to be a good title for that land as inam, whatever may have been the origin of possession."

The settlement of the inams and the general survey and settlement then in progress were closely inter-related. The land revenue of a village could not be fixed until the claims for exemption of land tax had been examined and adjudicated upon, while on the other hand, the inams could not be considered as finally settled until it had been ascertained by actual survey that the tax free land corresponded with what had been admitted to be entitled to be so held. Therefore the enquiry into inams preceded survey and the re-assessment of the land revenue. The Inam Commissioner validated titles and issued title deeds to inamdars lawfully in possession for fifty years before the appointment of the Commissioner and reserved others or commuted them for money pensions. One of the main functions of the Commissioner was the " enfranchisement " of inams. In the case of inams held for personal benefit, it was left to the option of the holder to retain it, if he chose, subject to the terms of the tenure, but he was prohibited from alienating the same. At the same time he was allowed to " enfranchise " it and convert it as his personal property by paying a quit-rent, i.e., a favourable rate. Inams were thus divided into—

(1) Unenfranchised inams,

(2) enfranchised inams,

(3) enfranchised but liable to jodi or quit-rent, and

(4) enfranchised, rent being commuted or redeemed.

After the enfranchisement of all the inams, the Inam Commissioner issued title deeds for the inams and they were passed and validated by the Inams Act IV of 1862 and 1866. By the enfranchisement the Government surrendered its reversionary right, for a quit-rent or jodi, and transferred the indefeasible rights of property to the grantee.

The Malabar Tenancy System

83. The land tenures prevalent in Malabar are peculiar to that tract. It is the only part of the Province where a really complicated tenancy problem exists. It may therefore be examined in some detail. The main division is between the landlord called " Janmi " and the tenants of whom there are several descriptions with varying rights. Of these the principal ones are in local terms called " kanam ", " kuzhikanam " and " verumpattam ". The use of technical terms cannot easily be avoided in the discussions connected with Malabar Tenures, as their ultimate foundations are set on legal conceptions and form the very spirit of the jural relationship between landlord and tenant. " Kanam " is described as mortgage

with possession, the mortgagee, i.e., the kanamdar recovering interest on the money he has advanced to the landlord from the produce of the land and paying a portion of the net profits as rent to the landlord. It thus partakes of the character of a lease and a mortgage. Sometimes the one character predominates, sometimes the other. In a kanam lease, the lease is the substantial thing, the security being a minor matter as in South Malabar. In the case of a kanam mortgage, the amount advanced is substantial, the "michavaram" or rent being but a trifle as in North Malabar [1] Kanam is now generally a lease for 12 years. The tenant on the expiry of the term takes a renewal from the landlord after paying a fee and is entitled to hold on for another period of twelve years. According to the provision of the Malabar Tenancy Act, 1930, it is obligatory on the part of the landlord to grant a renewal on payment of a fee which is also fixed by the Act. Kuzhikanam is the mortgage of waste land with a view to its being planted. In the event of the tenant failing to reclaim the land, plant trees, or otherwise fulfil the conditions of the deed, he can be dispossessed by the landlord before the expiration of the period specified. But for this, there is no difference between this and the kanam tenure. The tenant has the right to take a renewal on payment of a stipulated fee. Verumpattam is the name for ordinary lease for a year.

84. The tenancies in Malabar have been the subject-matter of acute controversies and elaborate examination. In 1880, Mr. Logan, the then Collector of Malabar, was appointed Special Commissioner to enquire into agrarian discontent in many parts of Malabar. In his report Mr. Logan stated that prior to British rule, no private property in the European sense of the term existed in Malabar, that Janmam did not import absolute property in the soil, and that the Janmi, "kanamdar" and the "Verumpattamdar" were in fact co-partners each entitled to one-third share of the net produce. He contended that the early English courts had misinterpreted the position and had endowed the janmi with powers like a landlord of the European type. Mr. Logan's report was circulated to a number of officials and non-officials and was then referred to a special commission whose report was later circulated to the High Court. Sir Charles Turner, the then Chief Justice, criticised Mr. Logan's views in very strong terms. First he denied the charge that the Courts had upset the customary relations of janmi and "Kudiyan," i.e., tenants. He also questioned Mr. Logan's theories relating to the ownership of the soil. He claimed that the Janmi's right in the soil was as complete as it was ever enjoyed by a free holder in England and this for some years gave a quietus to the controversy. In 1940, the matter was again reviewed by the Malabar Tenancy Committee. [2] They stated it has not been possible for the committee to come to any unanimous opinion regarding the origin of "janmam" and "kanam". The majority held the view that there was no evidence to show that the Janmi or the

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[1] Report of the Malabar Tenancy Committee, 1940, Volume 1, page 12.
[2] *Ibid.*

landlord was the absolute owner of the soil and the kanam holder a mere tenant-at-will. As the kanam holder was the occupier, he must have been the original owner. In tracing the history they suggested that the kanamdar must have acknowledged allegiance for his own safety to some Rajah, Local chief or Devasthanam (God) or Nambudiri Brahman and that the Janmam right might have originated in that way and might have meant only a sort of overlordship and not absolute right to the soil. The fact that all the lands in Malabar originally belonged in janmam to the Rajahs, Devasthanams and Nambudiris gives strength to this conclusion. They could not have actually occupied and cultivated such large blocks of land and therefore original occupation could not have been the basis for janmam. It is possible that these opinions expressed by the 1940 Committee might have been coloured to some extent by the political views of some of its members, as the committee was overwhelmingly "tenancy" in character. Up to date the actual right holder to the soil is still a matter of controversy. The "Janmi" and "kanamdars" have their own stock arguments in support of their respective views on the question.

85. The existence of strained relationship between the landlord and the tenant is common the world over and Malabar was never an exception to the rule. The genesis for all the troubles lay in the several unwritten "customs" prevalent in Malabar governing the relationships between the janmi and the kanamdar. These began to be misused and the relationship between them became strained. It has been mentioned earlier that the kanamdar takes a renewal from the landlord after paying a fee after which he is entitled to hold the land for another period of twelve years. The janmis in the early days began to misuse the position and granted leases to strangers. The landlord's power of ouster was widely used and in many cases, the tenants' improvements were not properly assessed or paid for. The kanam tenants had therefore to have recourse to law courts leading to uncertain judgments and delayed compensations. The tenants started agitation for the protection of their interests by the State. The tenancy enactments in the neighbouring states of Travancore and Cochin, where the tenures were similar to those prevalent in Malabar, acted as eye openers to the tenants of Malabar. By an order issued as early as 1829, His Highness the Maharaja of Travancore had declared that by established usage in the country, the kanamdar was entitled to remain in possession of the land as long as he paid the rent and other customary dues to the Janmi. The order also directed that the tenant should pay the Janmi his usual ordinary and extraordinary dues and that the Janmi should receive the same and let the tenant remain in possession and enjoyment of the property. This was reaffirmed and reiterated by Royal Proclamation in 1867 and by the Janmi-Kudiyan Regulation of 1896. This last enactment chiefly aimed at conferring on the Kanam tenant fixity of tenure by checking capricious evictions and restricting the demand for exorbitant rents and renewal fees on the part of the Janmis and

securing to the latter, punctual payment of rent and other customary dues. In the Cochin State an enactment on similar lines was passed in 1914. In Madras the first Act governing landlord-tenant relations was passed in 1887. It provided for the payment to the tenant on eviction of the full value of the improvements carried out by him. This Act, however, did not check the growing practice of evictions. On examining the position the Government came to the conclusion that the failure was to some extent due to the inadequacy of the compensation awarded to the tenants. The Act was replaced by Act I of 1900, which provided for adequate compensation. The new Act did not improve the position either, because what the tenant wanted was not compensation on quitting but the right to continue in possession of the land in peace by paying a fair rent. To remedy this unsatisfactory situation a bill was introduced in the Legislative Council in 1924. It was intended to confer fixity of tenure on all kanamdars and on all cultivators of the soil of certain categories. The bill was passed in 1926 but the Governor withheld his assent, as the bill as passed contained "various inconsistencies, ambiguities and other grave defects of form which would seriously increase litigation and indeed render the bill unworkable in practice if it became an Act". In order to re-examine the whole question the Government appointed a committee in 1927 to enquire and report on the disabilities of the tenants in Malabar, the extent of unjustifiable evictions by the janmis and the necessity for protection to "Kanamdars" and on the best means of remedying their disabilities. The Committee after elaborate investigation prepared a careful report and a draft Bill. Their main recommendations were accepted by the Government with some variations and a Bill was introduced in the local legislature and passed as the Malabar Tenancy Act, 1930. The Act in the main conferred fixity of tenure on cultivating verumpattamdars, subject to their paying what has been fixed as fair rent, and paying one year's rent in advance or otherwise furnishing security for the same. Fixity of tenure was conferred on Kanamdars, kuzhikanamdars and other intermediaries by enabling them to get renewals as a matter of right on payment of a renewal fee prescribed under the Act. In effect the Act secured for the tenant fixity of tenure and fair rent. Within a few years of the working of the Act, however, certain defects in the enactment became apparent. The Government actually gave notice of introduction of a Bill to amend the Act but on reconsideration decided on a more comprehensive legislation. The Malabar Tenancy Committee in 1940, examined and reported on the general question of tenancy reforms in Malabar. The question was however postponed for the duration of the war. The provisions of the various enactments mentioned above give an idea of the relations which existed between landlord and tenant in Malabar prior to those enactments and how the relations have since been improved. The present consensus of opinion is that further legislation is necessary to make their relations more cordial.

The South Kanara Tenancy System

86. The land tenure obtaining in the South Kanara district is the same as the ryotwari tenure obtaining in other parts of the Province but there are certain special features. The landholder is called wargadar. He may cultivate the land himself or give it on lease to tenants. The tenancy may be for a year in which case it is called chalgeni lease, for a term in which case the lease is called vayudageni lease or in perpetuity called mulgeni lease. In all cases, the rights between the landlord and the tenant are governed by the instruments creating the lease. In the absence of special provisions in the document the principles embodied in the Transfer of Property Act apply. Chalgenidars and vayudagenidars have no substantial rights in the land which can be mortgaged or alienated in any manner. The mulgenidars' right is ordinarily heritable and has a market value in the same way as the occupancy right of ryots having kudiwaram rights in other districts but there may be cases restraining alienation or imposing conditions involving forfeiture. In such cases the rights of the mulgeni lessee may not be worth much. Only a very small portion of the area in the district is covered by the mulgeni lease.

Record of Land Rights

87. In the Province there is only a revenue registry and no record of land rights has been attempted. The existing revenue registry is not evidence of title but a statement of liability to pay revenue and is still, in spite of prolonged efforts to improve its accuracy, notoriously defective. The Courts will not accept the entries as evidence. The Registration department registers deeds affecting title and by a system of indexing can furnish information about the origin of title, but it does not maintain any register of title or record of rights. In certain of the proprietary areas and zamindaris, record of rights has been prepared under Chapter XI of the Estate Land Act of 1908. Under section 164 of the Act, the Government have power to order surveys and a record of rights in respect of an estate or portion of an estate in the following cases :—

(1) Where the landholder or ryots or a substantial proportion of them whose interests are affected require the same;

(2) where in the opinion of the Government the preparation of such a record will help to avert a serious dispute and maintain good relations between landlord and tenant; and

(3) where the estate is managed by the Crown or is under the Court of Wards.

The record of rights prepared should generally contain the following information :—

(*a*) The name of each ryot and of each landholder in the estate or portion thereof;

(*b*) the name of the ryot or where there is no ryot, the name of the occupant;

(*c*) the situation and extent and boundaries of the land held by the ryot as shown in the survey map of the village;

(*d*) whether land is irrigated or dry, double or single crop;

(*e*) the rent lawfully payable at the time of the record and also whether the rent is permanently payable at a fixed rate or liable to be enhanced on the ground of a rise in prices;

(*f*) how the rent has been fixed, whether by decree or under the provisions of this Act or otherwise;

(*g*) any right lawfully incident to the holding;

(*h*) if the rent is gradually increasing rent, the times at which and steps by which it increases;

(*i*) if the land is claimed to be held free of rent whether rent is actually paid or not and when rent is not paid, whether the occupant is entitled to hold the land without any such rent and if so entitled, on what authority and the rent payable, if the land were liable to rent; and

(*j*) the record of irrigation rights ordered and the record of special rights in the waste land.

Restrictions on land alienations

88. The idea of restricting alienations of land dates back to 1872 when Mr. Justice Melville advocated the need for some restriction on transfer of land in the Punjab to prevent land passing from the agricultural classes to non-agriculturists for discharge of debts. The position was restated in 1886 by Mr. Thorburn, Financial Commissioner of the Punjab and as a result the Punjab Land Alienation Act of 1900 was passed. The Punjab thus became the first Province to enact a law on land alienation. The Act imposed restrictions on alienations of land by cultivating classes to non-cultivating classes, and made it obligatory on agriculturists to dispose of lands among their own class. It resulted in extensive benami transactions in the names of agriculturists. Though several amendments to the Act were made to prevent such benami transactions, on the whole the Act cannot be said to have worked satisfactorily in that Province.

In Madras there are no restrictions on alienations of land, excepting in the Agency tracts, nor is there any need for the same. The reasons are not far to seek. There are no distinct classes in this Province who can be termed agriculturists as opposed to non-agriculturists. Moreover restriction of transfer among a particular class of people results immediately in a marked depression in the value of land. The majority of agriculturists in this Province have very small holdings which are mostly uneconomic. Restrictions on alienations will not help them in any way but will make the process of consolidation of holdings difficult. In the Agency tracts the people are primitive and it is considered necessary to prevent them from being exploited by the plainsmen, but the Agency Land Transfer Act does not prevent the plainsmen from taking a mortgage of the actual crop and so is in effect infructuous.

Holdings of land

89. Madras is a Province of small holdings. The area of cultivated land per cultivator is 5·99 acres and the average size of a holding is 4·5 acres. The number of cultivated acres per farmer and the average size of holdings in the various Provinces in India in 1931 were as follows:—

Province.[1]	Number of cultivated acres per cultivator.	Average size of holdings in acres.
Bombay	16·8	11·7
Central Provinces	12·03	8·5
Punjab	8·8	7·2
Madras	5·99	4·5
Bengal	3·97	2·4
Assam	3·4	about 2·0
United Provinces	3·3	6·0
Bihar and Orissa	2·96	Between 4 & 5
Sind	..	38·7

The distribution of pattas among the various groups classified on the basis of their assessment is given below:—

Classification of holdings in Madras Presidency, Fasli 1350

Amount of assessment paid. (1)	Number of pattas, single and joint. (2)	Area. (3)	Average area. (4)
Less than Re. 1	1,465,575	928,778	0·63
Above Re. 1 and below Rs. 10	3,652,536	10,326,170	2·83
,, Rs. 10 and below Rs. 30	1,156,992	7,585,557	6·56
,, Rs. 30 and below Rs. 50	234,949	2,650,477	11·28
,, Rs. 50 and below Rs. 100	120,102	2,405,432	20·03
,, Rs. 100 and below Rs. 250	44,949	1,783,712	39·68
,, Rs. 250 and below Rs. 500	9,973	793,800	79·59
,, Rs. 500 and below Rs. 1,000	2,679	535,175	199·76
,, Rs. 1,000	2,069	630,403	304·54
	6,689,824	27,639,504	4·13

90. Out of 27,639, 504 acres of cultivated land in the ryotwari area in Madras, nearly two-thirds of the area is distributed among 6,275,103 pattadars. The total number of pattas, single and joint, number 6,689,824, in other words 94 per cent of the pattadars hold nearly 2/3 of the cultivated area of the Province and they pay an assessment of less than Rs. 30 each. Their average holding ranges from 0·63 to 6·56 acres with a mean of 3 acres. Thus a substantial number of holdings in the Province are uneconomic and their produce is not enough to maintain the ryots' family and the minimum livestock required for cultivation purposes. The total number of pattas paying an assessment of over Rs. 100 is 59,670 which is less than one per cent of the total number of pattas. This one per cent of the pattadars own nearly 14 per cent of the cultivated area. Their holdings vary from 40 acres to 305

[1] **The Indian Rural Problem by Sir Manilal B. Nanavati, page 147.**

acres with a mean of 63 acres. These are the bigger land owning classes of the Province. When the position of "holdings" in the various districts is examined, it is found that South Arcot has the largest number of pattas totalling over 7 lakhs for a total cultivated area of 1,659,291 acres. The average area per patta in this district is 2·25 acres, the smallest average for the Province. North Arcot closely follows with an average of 2·5 acres per patta. Out of the 24 districts (excluding Madras) 18 districts have holdings whose average acreages are under 5 acres, four districts have average holdings between 5 and 10 acres. Bellary and the Nilgiris have average holdings above 10 acres.

Trends of holdings

91. There is a definite tendency for the number of holdings in the Province to increase. The total number of holdings in the three preceding quinquennial periods is as follows:—

Fasli 1340	5,667,278
Fasli 1345	6,169,582
Fasli 1350	6,689,824

The increase in the total number of pattas during the 5-year period from fasli 1340 to 1345 was 502,304 and that from 1345 to 1350 was 520,242. In both cases the increase is about 9 per cent. Every year the number of pattas is increasing by one lakh and the population by one million. From the examination of the position in individual district it is found that in the 5-year period ending with fasli 1350, the number of pattas in Malabar has increased astonishingly, from 282,671 to 430,995, or 148,324 in five years. In the other districts the increase is normal.

Subdivision, Fragmentation and Consolidation of holdings, Causes of fragmentation

92. Subdivision is the division of the property among those entitled to share it. It does not by itself necessitate separation on land, though generally this follows from subdivision. Fragmentation refers to the manner in which the land held by an individual or an undivided family is scattered throughout the village area in plots separated by land in possession of others.

Fragmentation of land is brought about by the laws of inheritance prevalent in this country. When a ryot owning twenty acres of land in different places dies and his property is divided among his four sons it is usual for them to insist on separate portions from each block situated in the different places. This is accepted to be a safe procedure and is the result of their desire to share the good and the bad land equally. Population increase also aids in the process. When a family grows in 2 or 3 generations, the total holdings of the family also get increased by division among the heirs. Thus generally under Indian conditions fragmentation of holdings is the consequence both of the laws of inheritance and

the pressure of population. The revenue and the land tenure systems actively assist in the process or more correctly, have been framed to suit the sentiment and traditions of the population and allowing for such fragmentation. [1] "The essence of the ryotwari system which is in force in this Province is that each individual holder of land pays land revenue in proportion to the extent of his holding and to the quality of the soil. The Government look to him independently for the payment of such assessment and in consequence, does not prevent him, but, on the other hand actively assists him in subdividing the land according to his enjoyment."

"[2]Fragmentation of holdings is not peculiar to 'Indian Agriculture'. It occurs in France where the law of inheritance operates in the same direction." It is recorded that in some parts of France fragmentation goes to such an extent that the individual share is reduced to a single vine in a vineyard or a tuft of lucerne in the pasture. The problem, however, cannot be said to be so acute as it is in India as France has deliberately attempted to control growth of population. In parts of Germany and Switzerland, the evils of fragmentation have been very marked. The position in Japan and China is also not much better. [3]In China "it consists of anything from five to forty scattered squares, oblong strips, wedges and corners of land, scattered over hedgeless fields and sometimes at a distance of more than a mile from each other." "When a population as large as that of China is struggling for a foothold on an area which is already fully occupied and which in the view of some authorities is actually contracting, the multiplication of dwarf holdings is, in the absence of a deliberate policy to counteract it, the inevitable consequence. The results of economic pressure have been further intensified by the rule of prescribing equal partition of property among heirs."

Evils of fragmentation

93. In a country like India where the holdings are already small and in the margin of doubtful economy, fragmentation certainly worsens the situation and affects productive efficiency. In all agriculture, there is a minimum unit for efficient production which may widely vary, depending on the type of farming adopted. In many respects we have to admit that we have reached the smallest economic unit of production. When even this minimum unit is scattered in different places it certainly affects agricultural production. "[4] Fragmentation involves endless waste of time, money and effort, it restrains the cultivators from attempting improvements, it enforces uniformity of cropping and especially restricts the growing of fodder crop in the period when cattle are usually sent out to graze on the fields."

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[1] Royal Commission on Agriculture in India (Evidence), Volume III, page 264.
[2] Indian Agriculture– R. D. Tiwari, page 64.
[3] Land and Labour in China –R.H. Tawney, page 39.
[4] Royal Commission on Agriculture in India, 1928 (Abridged Report), page 135,

Apart from the fragmentation in the holding, fragmentation of cultivation is also a common feature. This arises when the tenant class unable to rent all they wish from single owners, search the village for more land for cultivation. In Madras, fragmentation of holdings is not so acute as elsewhere, but the existence of one and half million tenants must result in much dispersal of cultivation.

In some respects, it is argued, that fragmentation of holdings is an advantage. [1] It is said " where agriculture still depends a great deal upon rainfall and where all varieties of soil are met with, sand, loam and clay, the scattered holdings may not be a bogey as it appears. Scattered holdings are an insurance against the uncertainties of agriculture under the peculiar conditions of Indian rainfall." [2] Based on this argument some suggest that a moderate amount of fragmentation of lands based on different soil areas of varying degrees of fertility, which makes rotation of crops possible or insures the farmer to a certain extent against the vagaries of the monsoon, may be justified.

These arguments are to some extent far fetched. The variation in the climatic conditions within the limits of one village certainly must be very little. With regard to variations in soil, the advantages of fragmentation are more than offset by the disadvantages.

Fragmentation in Madras

94. There are no reliable statistics to show the extent to which fragmentation of agricultural land has proceeded in this Province. The only available statistics are those relating to holdings discussed earlier. Lands in the ryotwari areas are held under " pattas " and the patta may be in the name of a single individual or jointly in the names of several. During the last 3 decades there is a tendency on the part of the small holdings to become smaller as indicated by the statistics of the number of holdings and their extent. From this alone, it is not possible to deduce any conclusions with regard to the economic holdings of the pattadar. A man may hold more than one patta and a joint pattadar may in addition have a patta or pattas standing in his name alone. Moreover the smaller holders may have some subsidiary occupation as agricultural labourers or as lessees working in others' fields. Apart from giving the size of the holding the figures do not afford any idea of the extent of fragmentation and it is just possible that a tiny holding may itself be fragmented and held in different places.

History of consolidation

95. The problem of fragmentation of holdings has been considered in this Province from early days. In 1911, the Government considered the question of restriction of subdivision of holdings below a fixed minimum area but came to the conclusion that there

[1] Fields and Farmers in Oudh (Introduction) by R. K. Mukerjee.
[2] Life and Labour in a Gujrat Taluka—J. B. Shukla.

were weighty reasons against any attempts in this direction. They were chiefly influenced by the view that " a record of individual holdings is an essential part of the ryotwari system and that all inaccuracies in the record, must, to a greater or less degree, operate as an impediment to the revenue administration." It must be remembered that at that time the Government considered only the question of subdivision of holdings and not fragmentation; but fragmentation is the physical consequence of the legal right of subdivision of landed property. It will be generally noticed, however, that the two expressions are loosely used as synonymous.

Public attention was drawn to the problem by a resolution moved in the Madras Legislative Council in 1917. The resolution read " This Council recommends that His Excellency the Governor in Council be pleased to consider the desirability of checking the minute subdivision of agricultural lands in this Presidency." The Government accepted the resolution and undertook to consider the matter. At that time Mr. Keatinge, the then Director of Agriculture in Bombay, was attempting to form economic holdings in that Province. In his report on the subject he dealt in detail with the causes and economic evils of fragmentation of holdings. He also indicated how in other countries similar causes had produced similar results and what remedial measures had been taken by them to meet the evil. Copies of his report and draft Bill were circulated in this Province with a view to ascertaining how far the proposed legislation could be made applicable to the holdings in this Province. The Bombay Bill was only permissive in its character and provided for the formation of economic holdings by the Collector and also for the framing of special rules of succession in regard to them. The result of the circulation of the report and the Bill was disappointing. Neither the ryots nor the officials were in favour of the legislation. Some of the objections according to the Board of Revenue were—

(1) There would be the utmost difficulty in determining for the purpose of the Bill what constitutes an " economic holding ", the value of land varying as it does, according to the nature of the crops it can produce, the method of its cultivation, climate, the standard of comfort of the owner and so forth.

(2) The Bill aims at creating a vast mass of petty impartible holdings all over the country in defiance of the whole social system of Hindus and Muslims alike.

(3) Its operation would, as a rule, be confined to those families which are rich enough to compensate such members as are excluded from the economic holding, that is to say, to the very cases in which there is the least need for any special arrangements. In so far as the Bill could be applied to poor families it must tend to create a landless proletariat which is always a danger and doubly so in a country where industries are so little developed that they cannot absorb the surplus agricultural population.

(4) It would afford an opportunity to co-sharers to effect collusive registration for the purpose of defrauding creditors.

(5) Its general effect would be to impair the credit of the agricultural classes.

(6) All transactions relating to land would be complicated by the question whether the condition of impartibility existed.

(7) It would involve the revenue establishment in troublesome and often infructuous inquiries on applications for creating economic holdings and on complaints that the rule of impartibility had been broken.

(8) It would undoubtedly prove a fertile source of strife in families.

96. The Government were not prepared to undertake legislation even of a permissive character. The Board was instructed to consider the possibility of carrying out an experiment for the rearrangement of holdings by consent in some typical villages in a district in which special staff was engaged on adangal revision prior to resettlement. The experiment was attempted in Trichinopoly. The Special Settlement Officer after trying the experiment for some time reported : " An attempt has been made to get ryots to rearrange their holdings at the time of the hearing of objections to rough pattas, but nothing has come of it. The fact is regretted, but I do not think that under present conditions anything ever will come out of it. These small pieces of land which it is desired to redistribute vary largely in fertility and value and are inconvenient for cultivation by different ryots. To effect a just and equal redistribution of these lands among the ryots and, what is more, to persuade these people who are by nature suspicious and opposed to innovations that the distribution is a just one and to their advantage, is an extremely difficult task, and it is a task that can only be attempted with any prospect of success by an officer of status sufficiently high to inspire confidence, who has ample time to sit down in villages, make himself known to the people, gain their confidence and, in fact, make himself a regular missionary preaching the benefits of consolidation of fragmented holdings."

The Government then considered that, " so far as this Presidency is concerned, the problem is beset with difficulties and that it is not capable of such an easy solution as might appear at first sight. The proposal runs contrary to the traditions and practices of the smaller holders of land. There are again cases in which subdivision is inevitable, e.g., where part of a holding is transferred or a joint holding is divided among the joint pattadars. Refusal to subdivide in such cases will result in hampering dealings in land and merely increase confusion between real and nominal owners. Legislation in such matters is out of the question ; and any attempt to discourage subdivision below a certain limit by the levy of a prohibitive fee or otherwise is likely to be resented. So long as subdivisions have to go on for one reason or another any attempt

at consolidation of existing fragmented holdings is bound to fail and it will serve no useful purpose to allow the time of Settlement Officers to be wasted over it." The Government accepted the conclusions arrived at by the Settlement Officer and directed that the experiment be discontinued. It was the Government's considered opinion that the evil rested with the people themselves and that the problem would have to be solved by educating the ryot on the evils of fragmentation. A pamphlet was accordingly prepared by the Registrar of Co-operative Societies in 1920 and published by the Publicity Bureau. The Royal Commission on Agriculture in 1928 recommended that the only measure that appeared to promise relief from the evils arising from fragmentation was a process of consolidation by which striking results had been achieved in the Punjab through the agency of the Co-operative Department. In this connexion they referred to an Act passed in the Central Provinces which gave power to holders of not less than two-thirds of the occupied area to agree to the preparation of a scheme of consolidation. The scheme, when confirmed, became binding on all the permanent holders. The Commission suggested that such legislation might prove of value. The subject was again taken up. Official opinion was inclined to the view that " there is no doubt that fragmented holdings involve some waste of time and labour, but there is no sign that as a consequence of this, land is going out of cultivation or that the development of irrigation by wells is impeded " or that the excessive bunding involved caused a waste of land which are among the practical difficulties experienced in the Punjab. Well irrigation in Madras is chiefly confined to a small number of acres under valuable crops and is not handicapped by the fact that the holdings are not extensive. Excessive subdivision and fragmentation are most prevalent in the deltas where bunds are an incidence of paddy cultivation. Fragmentation is considered to be an advantage in the deltas, where transplantation is the rush season and it is a disadvantage for a ryot to have all his lands in one block which has to be transplanted at the same time. It is more economical for himself and his cattle that the lands should come under water progressively and this he secures to some extent by owning lands in different areas of his village. Serious attention was paid to the problem again more recently and co-operative societies were formed for consolidation of holdings. The Government gave the following facilities :—

(1) Members of consolidation societies are permitted to inspect and take notes of entries in certain village accounts and documents including field measurement book and register of holdings.

(2) Officers of the Co-operative Department have access to the register of holdings kept in Sub-Registrars' offices.

(3) Revenue subordinates and village officials have been instructed to render all possible help in encouraging the formation of consolidation of holding societies and in other ways.

(4) The Government of India grant for rural reconstruction was utilized also for the formation and encouragement of co-operative societies for consolidation of holdings. These societies had to

pay only one-third of the fee payable by co-operative societies for encumbrance certificates and registration of documents, the remaining two-thirds being met from the Government of India grant. The number of societies working from 1937–38 is shown below :—

Year.	Number of societies working.	Year.	Number of societies working.
1937–38	5	1941–42	25
1938–39	16	1942–43	24
1939–40	22	1943–44	23
1940–41	26	1944–45	22

The total extent of land consolidated by these societies up to 30th June 1945 was 1,463 acres, of which 558·38 acres were in West Godavari, 306·45 acres in Trichinopoly, 255·16 acres in North Arcot, 123·64 acres in Guntur, 102·04 acres in Anantapur and 77·30 acres in Nellore. Small extents of land were consolidated by the societies in South Arcot, Kistna and Tanjore.

Agrarian Reforms—Conclusions

97. The description of the various kinds of rights in land given in the foregoing paragraphs can be analysed under two heads. First, the relation between the holder of the land and the Government and second the relation between the owner of the land and the cultivator. In regard to the former it is seen that circumstances of history and the exigencies of the political needs at certain times have played a large part in defining the status of the holders of land in relation to the Government. Of the two main systems of land holding and land revenue rights the only vital distinction, now that occupancy rights have been guaranteed in zamindari and inam areas also, is the existence of an agency between the cultivator and the Government which takes part of the produce and in some cases more than what the Government would have received otherwise from the holder of the land itself; in other words, while the ryotwari system contains in the order of ascendency the landless cultivator, the cultivating tenant, the land-holding ryot and the Government, the zamindari system interposes a rent receiver between the land-holding ryot and the Government.

Of the several land reforms suggested to improve the agriculture of this Province, the following are the most important :—

(1) abolition of the zamindari system;

(2) grant of occupancy rights to established tenants; and

(3) the grant of rights to the use of land but not to the ownership thereof; in other words, the nationalization of property in land.

Other reforms of a more detailed character can be fitted into one or another of these heads.

98. The zamindari system is an undoubted survival from the past age and on pure merits has no legs to stand on. It gives to private individuals revenues that should justifiably go to the State. It

will be in the line of progress to gradually eliminate zamindari rights in land. A great deal of detailed work will, however, have to be done before the zamindaris are taken over. The present value of the zamindari rights has to be ascertained. The chief difficulties here are in valuing the average annual income. It is found that under the management of efficient zamindars the proportion of actual rent collected to the rent due is higher than in the case of mismanaged estates. The Court of Wards has always managed to secure a greater percentage of rent each year than the zamindars themselves could. There are also difficulties in the way of valuing assets like forests which have been grossly mismanaged in many estates. After the ascertainment of the income the question of the method by which the zamindari should be purchased arises. This can be done either by means of an annuity or by outright purchase. The former can be related to the probable income to the Government from the zamindaris and the expenditure on them—again a complicated question—while the latter will involve raising of huge loans. This can perhaps be done by the issue of debentures of a long-dated character. The greatest item of work in taking over these assets will be an elaborate survey and settlement that will have to be carried out in most of them to bring them into line with ryotwari areas. The question is vast enough for a special staff consisting of judicial and administrative officers to be appointed.

99. As regards the right of occupancy the question has to be examined by reference to the actual agricultural economy in the country. It has already been noticed that the majority of the agriculturists in the Province cultivate their own land. The problem cannot be said therefore to be a huge social evil in this Province. In the dry tracts it is the cultivator who predominates. It is in the wet deltaic tracts that absentee landlordism exists to some extent. In Malabar, however, the problem is complicated by the existence of legal rights evolved by long years of history of certain intermediate holders. The legal side of the question should not be given an undue importance, because, once it is decided on the basis of a broad social need that intermediate rights in land should be abolished then it will be for the Government of the day to decide whether this should be done outright or compensation awarded to those whose rights are extinguished. The more important question is whether such a step will cure the evils which exist to-day. As long as land is held as private property and is bought and sold as a source of investment in exactly the same manner as a house or Government paper, there is no method by which absentee landlordism can be prevented. It will play its part in the economy of the nation like other forms of private property. Restrictions on the right to alienate do not serve a very useful purpose. In the Punjab the Land Alienation Act has not been a conspicuous success because it has always been open to a person to buy just enough land to come under the definition of a landholder. In the Agency tracts of this Province where alienation of land to

plainsmen is prohibited, such benefits as may accrue have been completely nullified by mortgages of the actual produce by the Agency men. Further, the grant of rights to those who do not possess it now can succeed in the long run only after steps are also simultaneously taken to prevent such persons from selling their right at a later stage. In other words, the grant of occupancy rights by itself merely confers the right to property on those who do not now possess it. The verumpattamdar of Malabar, for example, has no right worth mentioning in the land which he cultivates but if he is given the right of occupancy then he becomes a man of property and graduates into the status of a kanamdar. He will then raise money on his land which he cannot do at present. At the same time, if together with the grant of occupancy rights, restrictions on alienation are also imposed, then we are confronted with a separate kind of difficulty, namely, a fall in the investment value of land as property. Logically, therefore, an ideal land policy should see first that everyone who owns land should cultivate it himself, second, should take steps to prevent the land from passing into the hands of absentee holders and third should see that the minimum size of economic holding is maintained by further restrictions on the right to partition the property amongst one's heirs. It may very well be asked if such a logical land policy can be carried out in this country.

The fact of the matter is that at present land is the main source of income to the majority of the population. It is a lopsided economy that the country is suffering from. As long therefore as there are no alternative sources of employment and of producing wealth and a certain number of people live off the land, any steps that may be taken to restrict alienation or curtail the right to inherit and subdivide landed property or to do away with the rights of intermediate holders will merely lead to subtle attempts to get round the law in one way or another. What is therefore necessary is to plan the economy of the country in such a way that the pressure on the land is released and the income from the land is divided amongst a greater number of people than at present.

100. Nationalization of land has been attempted in Russia. This would partly mean in actual practice the right to use the land for productive purposes but not the right to land itself. There can be no logical objection to such a step and it is purely a question of policy whether this should take the form of pure expropriation of existing rights or expropriation with compensation. This does not however prevent two lines on which action may be taken even at present. The first is the application of this principle when new lands are granted by the Government. Here the Government are not restricted by rights that have already accrued and the field for experiment is therefore considerable. Secondly, permissive legislation can be undertaken for combination of cultivation as distinguished from combined ownership. Measures for the

consolidation of holdings will be a first step in this direction. Independently of this, there is no reason why in areas which are suitable for the purpose, cultivation cannot be carried on in common. This would be difficult in areas where the fertility of the land even in compact areas varies considerably as in the deltaic tracts but in the dry areas the measure is feasible and should be tried. This is especially important now as the numerous results of research in agricultural technique can be translated into practice and be made to accrue for the benefit of the cultivator only over large tracts. Perhaps this experiment also may be tried in areas which are not encumbered by previous legal rights, viz., where new Government land is granted under irrigation projects.

CHAPTER IV—IRRIGATION

101. Over the greater part of South India, the rainfall is unevenly distributed and is often liable to failure or serious deficiency. Consequently successful crop production cannot be assured in most of the areas without supplementary facilities for watering crops. One important factor that materially contributes to the inefficiency of Indian agriculture is its unreliable water-supply. "[1]India owes in a great measure to her former rulers the first inception of her present unrivalled system of State irrigation works." The most efficient and useful works which were constructed in former times are, however, the smaller works, tanks, weirs and river channels—which are found scattered throughout South India. They are most numerous in this Province where even now they collectively irrigate an area almost equal to that irrigated by all the larger works which have been constructed by the British Government. With the early history of the construction of irrigation works by the British Government, the name of Sir Arthur Cotton is always inseparably associated. In 1836, he constructed the Upper Anicut across the Coleroon river, so as to maintain the level required for the full utilization of the ancient dam or "Grand Anicut" across the Cauvery, which he also strengthened and restored. To this work, the district of Tanjore largely owes its present prosperity. Subsequently Sir Arthur Cotton designed the works which, constructed and improved at a cost of about three crores, now irrigate more than two million acres in the Godavari and Kistna deltas.

Classification of irrigation works

102. [2]Irrigation works may be divided into two main classes, those provided with artificial storage and those dependent throughout the year on the natural supplies of the rivers from which they have their origin. In Madras we find mostly non-storage systems. The non-storage canals themselves may be divided into two main types, perennial canals and inundation canals. Perennial canals are provided with some arrangements in the vicinity of their heads, usually in the form of an obstruction across the bed of the parent stream, by means of which they are enabled to obtain their supplies irrespective of the level of the water in the river. The water is, by means of this obstruction, ponded up to the height required in the canal, and seasonal fluctuations in the water level in the river are thus counteracted. The obstruction usually takes the form of a weir or barrage fitted with shutters and sluices whereby surplus water not needed in the canal can be escaped down the river. Inundation canals, on the contrary, have no such weirs and their supplies fluctuate with the natural water level in the

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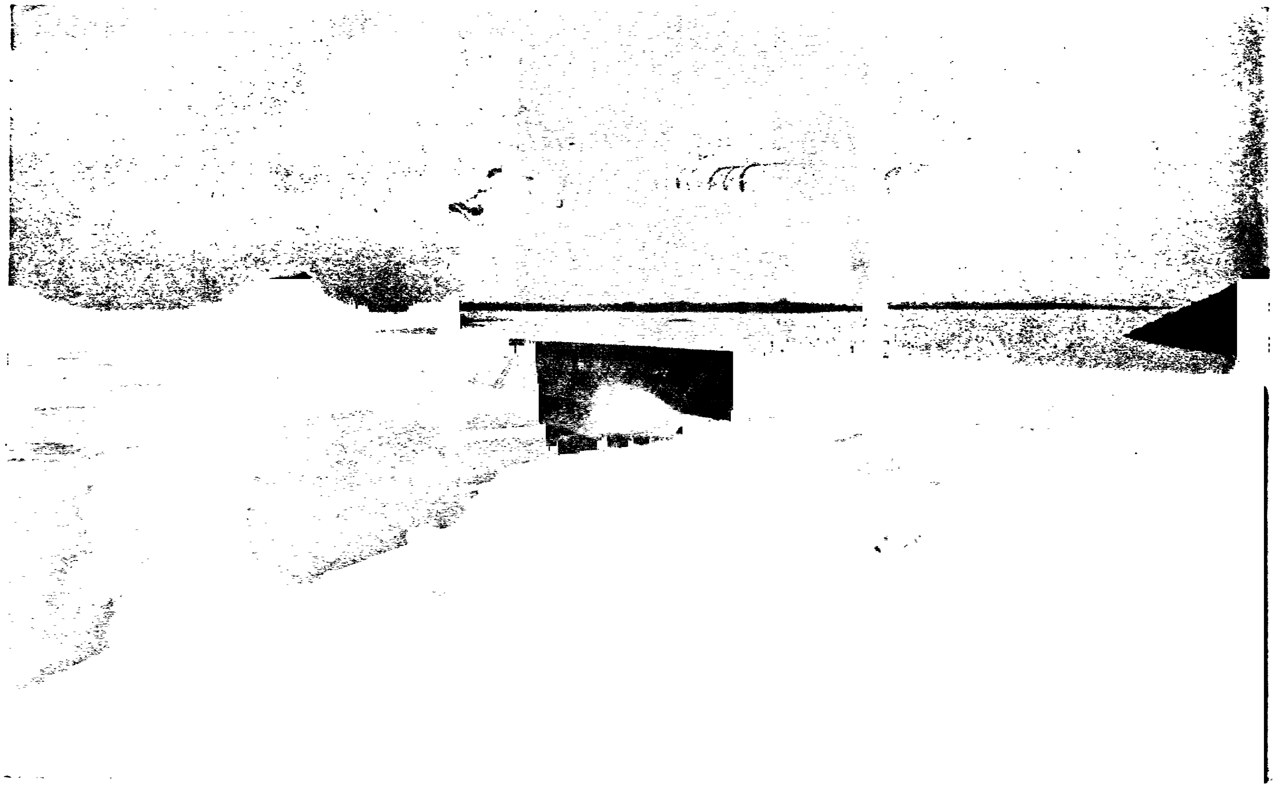
[1] Report of the Indian Irrigation Commission, 1901–1903, Part I, pages 9–10.
[2] Triennial Review of Irrigation in India, 1918–1921 (Government of India), page 4.



GENERAL VIEW OF METTUR DAM AND RESERVOIR

river. Generally inundation canals obtain a supply only when the parent stream is in flood and the adequacy of this supply, and therewith the area irrigable, is consequently dependent upon the seasonal conditions. There may be an ample volume of water in the river but, in the absence of any method of raising its level, it cannot be forced into the canal until the water rises, of its own accord, to a sufficient height. The expedient of storing water in the monsoon for utilization during the subsequent dry weather period has been practised in India from early times. In the simplest form such storage works consist of an earthen embankment constructed across a valley or depression, behind which the water collects, and from such small works irrigating only a few acres, storage works range in size to huge reservoirs like the Stanley Reservoir at Mettur with a storage capacity of 93,500 million cubic feet of water when full. For the purpose of determining the source from which the funds for the construction of Government works are provided, irrigation works are divided into three classes, productive, protective and minor works. Productive works are those that produce sufficient revenue to cover working expenses and the interest charges on the capital cost. Due to the extreme difficulty of forecasting the financial results of a scheme with accuracy, many works sanctioned originally as productive have, in operation, proved unremunerative.

Protective works are constructed primarily with a view to the protection of precarious tracts and to guard against the necessity for periodical expenditure for the relief of the population in times of famine. The general policy of constructing protective works owes its origin to the great famine of 1877-78.[1] After that famine, the Government of India decided to set apart every year a sum of Rs. 150 lakhs known as the Famine Relief and Insurance Fund, for famine relief and the construction of protective works. Of this amount, one half or Rs. 75 lakhs was to be allotted to protective railways and canals. The charge on the fund on account of the protective railways however ceased to be imposed and the whole of the seventy-five lakhs became available for irrigation works. In 1910, the allotment was found to be insufficient for the programme of constructing the then contemplated works and provision of an annual subsidy of Rs. 25 lakhs was sanctioned by the Secretary of State. However the full allotment of one crore was never worked up to. The expenditure of the amount was governed by the principles laid down by the Irrigation Commission for the construction of protective works. The Irrigation Commission had recommended that it would be permissible to spend up to three times its direct "protective" value for each acre irrigated, worked out by a formula[2] which they suggested, to which might be

[1] Report of the Royal Commission on Agriculture in India (Abridged), 1928, page 334.

[2] The formula suggested was

$X = \frac{F}{Fs - a}$ where X = the direct protective value of an irrigated acre, or the capitalized value, at 25 years' purchase, of the saving in average annual cost of famine which will be effected by every acre brought under irrigation.

added the capitalized value of the net revenue anticipated from each such acre, in payment for the water provided. The sum of these items was the "permissible capital outlay per acre" and in the case of every protective work submitted for sanction, it had to be indicated that the permissible outlay would not be exceeded.

103. The formula enunciated by the Irrigation Commission was found unworkable for the reason that owing to a variety of causes, the actual expenditure on famine relief decreased in later years. In 1931, the Government reviewed the position and abandoned the formula and substituted some general principles on which to base a decision. An irrigation project should ordinarily be a paying proposition. The criterion for this was a net revenue equivalent to a minimum of six per cent on the sum-at-charge ten years after completion. In special cases, the Government may, in view of the indirect returns and benefits of a project both to the Government and to the people in general, undertake protective irrigation works, though they yield a smaller return. The anticipated net return from a protective irrigation work ten years after completion should be not less than three per cent on outlay on works. As different tracts required different degrees of protection, different criteria were necessary for different tracts. The taluks of the Province were therefore grouped into four classes, A, B, C and D by reference to the extent of their liability to famine and the consequent need for protection and it was laid down that the criterion to sanction protective works in each of these classes of tracts, A, B, C and D should be a return of 3, 4, 5 and 6 per cent, respectively, on the capital outlay. This classification was to apply only to protective works financed from ordinary revenues or from the excess over Rs. 40 lakhs in the famine relief fund. In 1937, consequent on a fall in the rates of interest, the rate for judging the productivity of irrigation works was fixed at four per cent and in 1938 proportionate rates for protective works for the various classes A, B, C and D were fixed at 2½, 3, 3½ and 4 per cent, respectively.

Generally minor works include those which are not classified as productive or protective. The majority of them are indigenous works which the Government have taken over, improved and maintained. They include many inundation canals, many small tanks, storage reservoirs scattered throughout the Province and some 47,000 and odd minor tanks and petty irrigation works. No

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F = Estimated total cost of famine in the given tract for a period of 25 years, or quarter of a century.

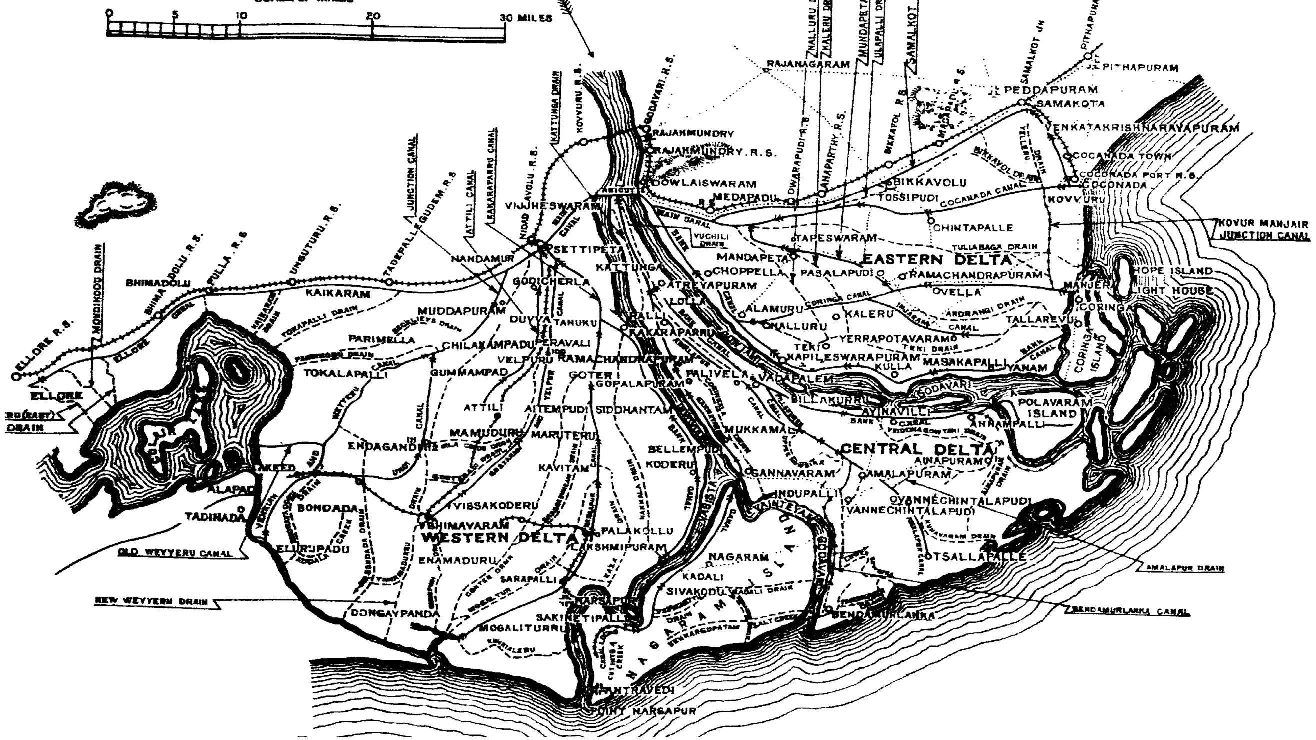
P = Population of the tract, with necessary addition for prospective increase.

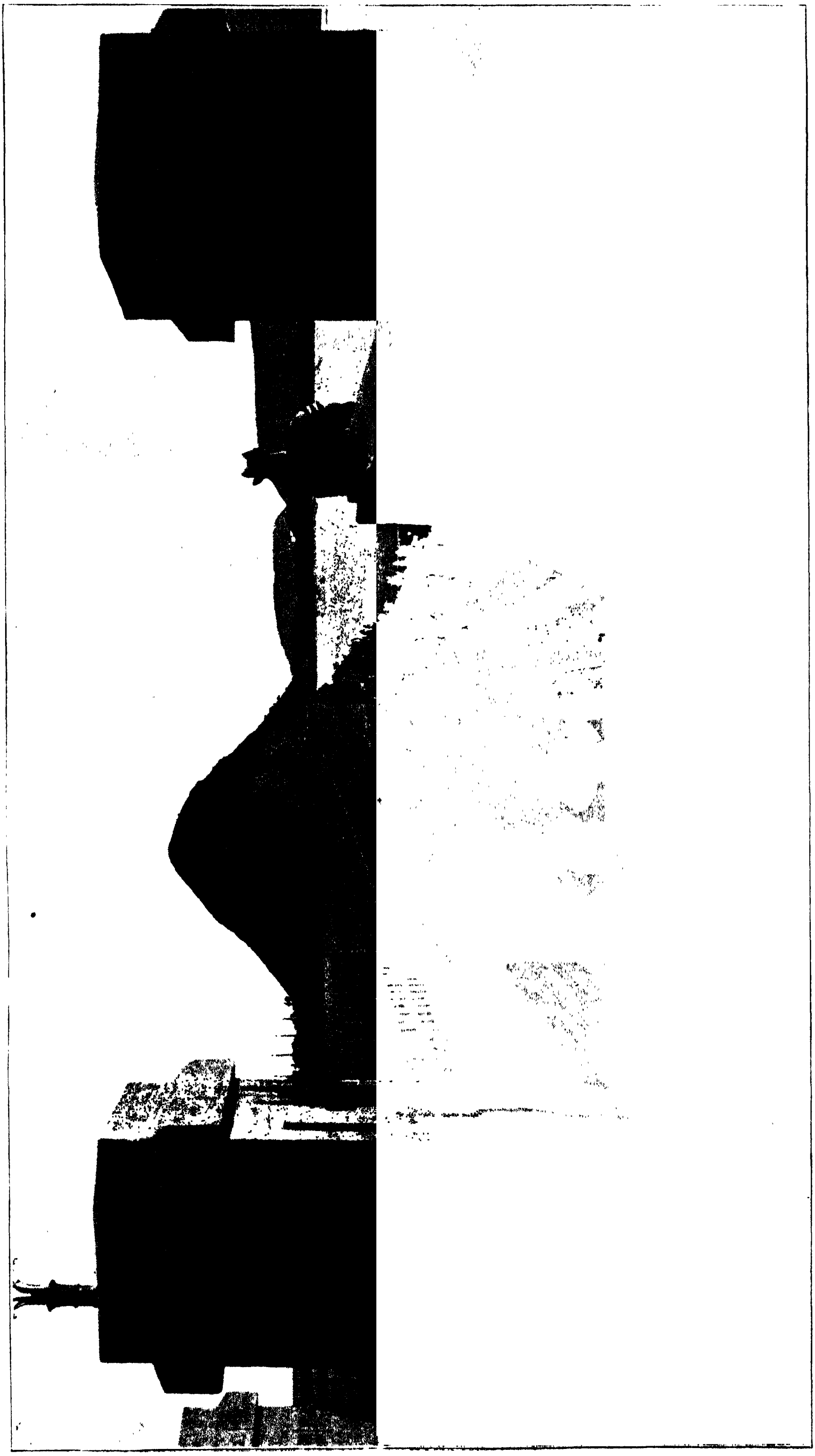
n = Area in acres which should be protected by irrigation for each head of the population.

a = Area in acres already protected.

The co-efficient 'n' was a variable one in each tract but the Commission held that in insecure tracts, it would probably never be less than 0·3 or more than 0·5 and that other things being equal such as the character of the cultivation and the nature of the staple crops the value of 'n' should diminish as the area normally cropped per head of population increased.

SKETCH MAP
OF THE
GODAVARI DELTA
SHOWING POSITIONS OF
THE PRINCIPAL IRRIGATION & NAVIGATION WORKS





separate capital and revenue accounts are maintained for these works.

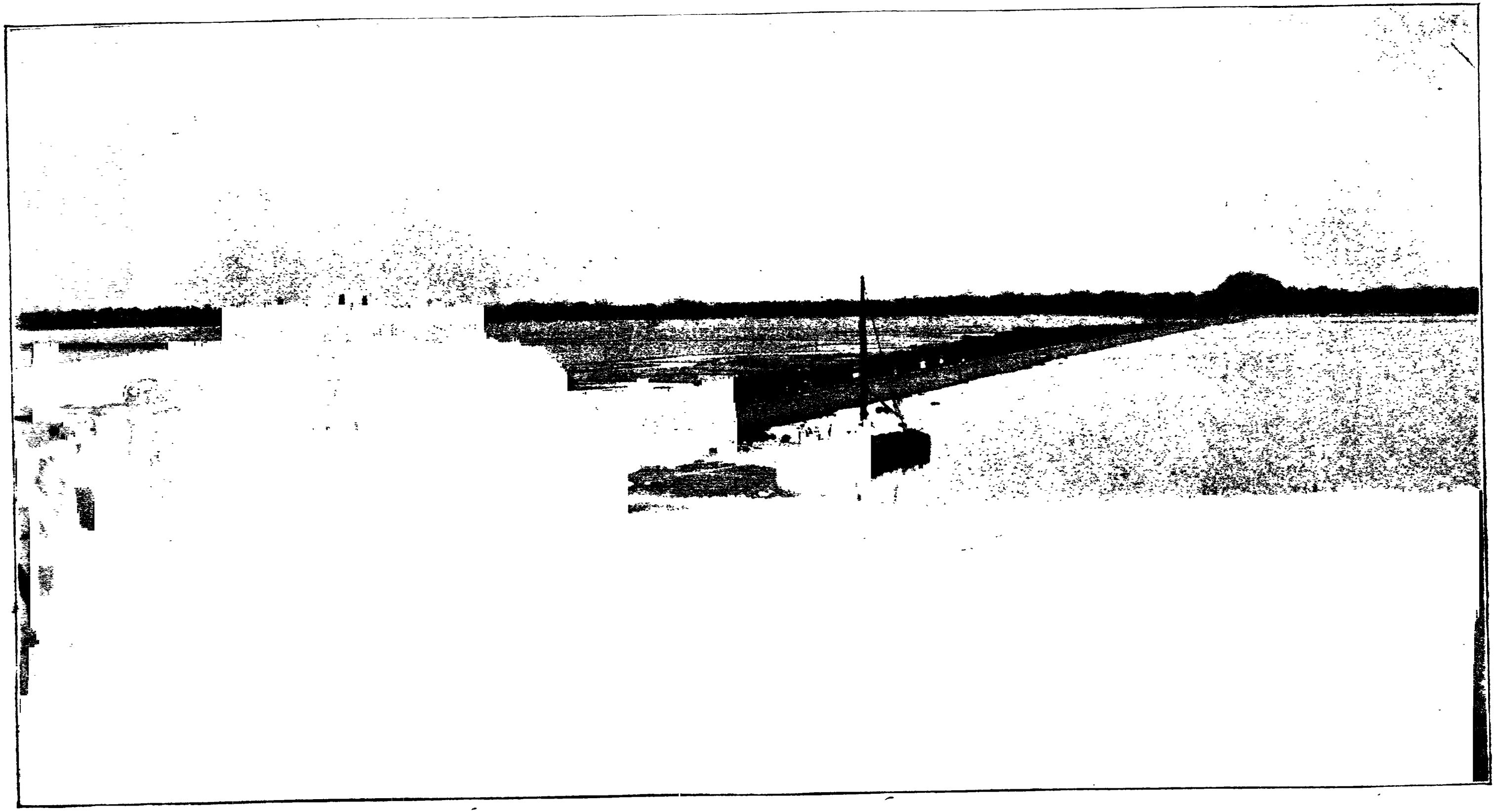
Important Irrigation Systems of the Province

104. *Nagavalli system.*—The Nagavalli system irrigates a large area in the Vizagapatam district. By means of a regulator across the Nagavalli river water is diverted through a main canal 22 miles long and with the branch channels irrigates roughly 27,900 acres. The project was completed in 1909 at a cost of Rs. 18 lakhs and now returns 1·13 per cent on the outlay. Quite a large area in Vizagapatam and that part of the old Ganjam district which still remains in this Province are irrigated under channels which take off from the river without the help of regulators or anicuts. Though individually the area under each channel is small, the total area irrigated is nearly 67,000 acres.

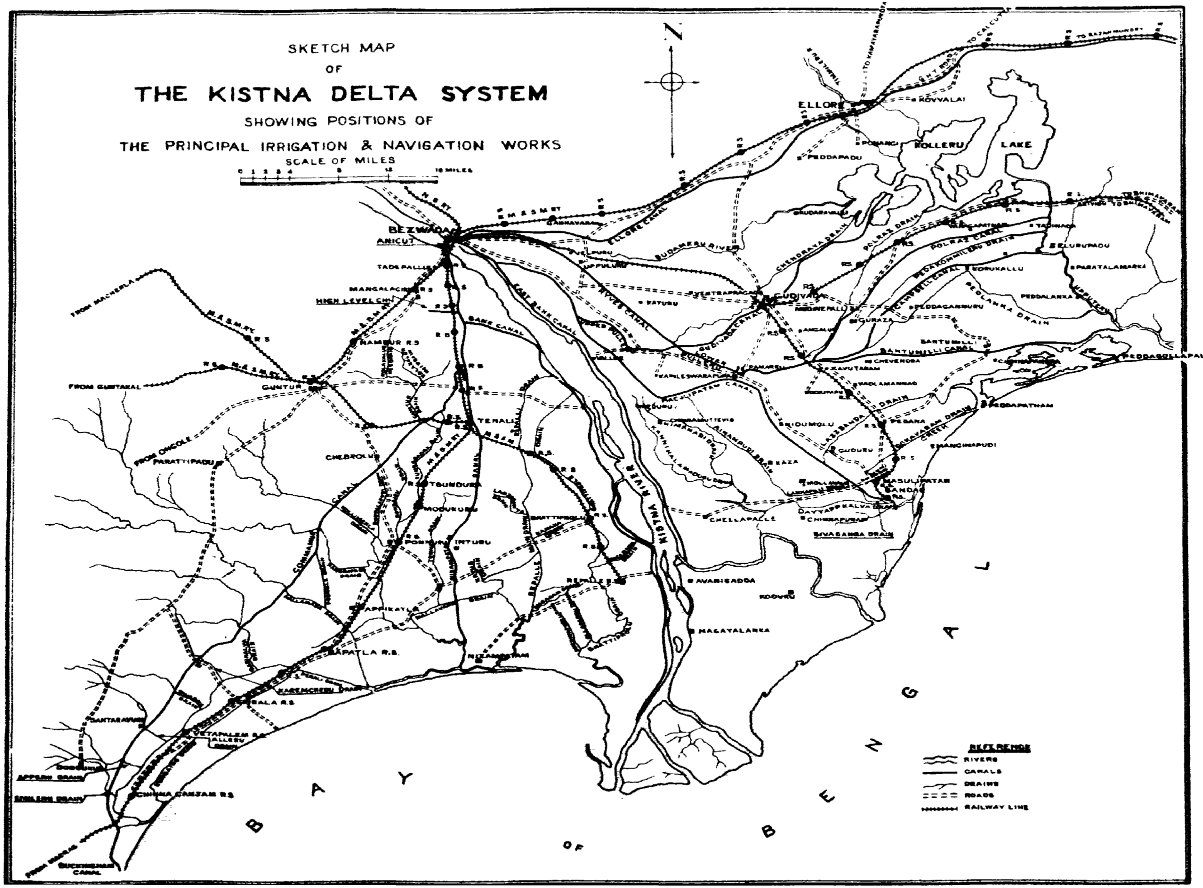
105. *Godavari system.*—Prior to 1840, the Godavari district was frequently the scene of bad famines. In 1832–33 a terrible famine ravaged the district and the calamitous famine of 1840–41 followed after some more bad years. The decreasing population and the dwindling revenue spurred the Government to action, and Major Cotton (later Sir Arthur Cotton) who had just then completed a work in the Cauvery suggested the construction of anicuts at Dowlaishweram and the excavation of three canals. The works were sanctioned almost immediately and soon the anicuts and the canals were built. The works were without parallel in the days they were executed. It is to the genius, keenness, and intrepidity of Sir Arthur Cotton that Madras owes these monumental works. The system consists of anicuts in four sections and three main canals irrigating three deltas. The anicuts are the Dowlaishweram 4,839 feet long, Ralli 2,859 feet long, Maddur 1,550 feet long, and Vazeswaram 2,601 feet long. The old anicuts were soon found to be low and had to be raised slightly and fitted up with falling shutters two feet high. In 1935, the two-feet shutters were replaced by three-feet shutters and a steam plough to lift the shutters was also installed. The headworks consist of head and under sluices and a head lock for each of the three deltas, viz., Eastern delta about 450 square miles on the left margin of the river, the Central delta about 500 square miles between the two branches into which the Godavari divides itself (the Gautami and the Vasishta) and the Western delta about 1,000 square miles on the right margin stretching as far as the Colair lake. In the Eastern and Western Deltas, the Samalkota and Ellore (Contour) canals define the limits of irrigation to the areas enclosed between them and the Godavari river. They also form the link between Cocanada and Ellore where the Kistna-Ellore canal flowing north from Bezwada meets the Godavari-Ellore canal. The Central delta, particularly the " Nagaram " island, is the garden of the Godavari district and is noted for the remarkable Gannavaram aqueduct which was completed in about eight months in the fifties of the

last century, a remarkable feat due to Captain Orr. The Polavaram aqueduct at Annampalli is a similar but more recent construction to irrigate Polavaram island. The river and its branches are banked throughout to protect the deltas from the floods. The canal system in all the deltas is navigable throughout and carries annually a traffic valued at nearly Rs. 25 crores and about Rs. 2½ crores worth of timber besides transporting about a million passengers. The canals irrigate about eight lakhs of acres but the total area irrigated in a year is over a million acres including two crops and the value of the crops grown is over Rs. 10 crores. The system cost about Rs. 1·95 crores and returns about 20 per cent on the outlay. In the same district, there is the Polavaram island system which consists of a canal taking off from the bank canal, Godavari Central Delta, about half a mile above Annampalli lock. The canal crosses the Vriddha Gautami by a masonry aqueduct and irrigates the Polavaram island enclosed by the two branches of the Gautami Godavari. The system irrigates lands in the East Godavari district. It costs about Rs. 17 lakhs and returns 4·02 per cent on the capital outlay.

106. *Kistna system.*—The history of the Kistna anicut follows almost the same course as that of the Godavari. The success of the Godavari works and the genius of Sir Arthur Cotton were again responsible for an anicut at Bezwada and two canals on the margins of the river. Since the anicut was built, it was raised one foot and fitted with three-feet falling shutters. In 1935, even this anicut was found to be too low and it was raised another three feet by fitting up six feet falling shutters, worked in sets hydraulically and a steam plough to lift them. The headworks consist of an anicut, head and under sluices and a head-lock for each of the two deltas. The Eastern delta has an area of about 1,160 square miles and stretches in the north as far as the Colair. The Western delta is about 950 square miles and goes south as far as Pedda Ganjam. The Kistna-Ellore canal in the Eastern delta connects with the Godavari-Ellore canal in the north and the Commamur canal joins the Buckingham canal in the south. These contour canals and the interior canals afford means of irrigation and transport for both the deltas. The Divi island at the tail-end of the system was irrigated by diesel engines and pumps pumping water from the river till 1935 when the Puligedda aqueduct was built to carry the Kistna East Bank canal across the river to Divi. This canal now irrigates the entire area in Divi island. The river and the Divi island are banked to protect the deltas from the floods. The canals are navigable and carry annually cargo valued at about Rs. 16 crores, timber worth about Rs. 45 lakhs and about 2 lakhs of passengers. The system irrigates about nine lakhs of acres. It costs about Rs. 2·25 crores and returns 16·63 per cent on capital outlay. Associated with these is the Kistna East Bank Canal system. The Kistna East Bank canal takes off from the Masulipatam canal. The canal is navigable and runs alongside the river for a considerable distance before it crosses the Puligedda arm of



BEZWADA ANICUT—GATE VIEW—KISTNA DELTA


SKETCH MAP
OF
THE KISTNA DELTA SYSTEM
SHOWING POSITIONS OF
THE PRINCIPAL IRRIGATION & NAVIGATION WORKS
SCALE OF MILES
16 MILES
N
ELLORE
KOVVALAI
KOLLERU
LAKE
PEDDAPADU
BEZWADA
ANICUT
TADEPALLE
MANGALAGIRI R.S.
HIGH LEVEL CH.
NAMBUR R.S.
GUNTUR
FROM GUNTAKAL
FROM MACHERLA
FROM ONGOLE
PARATTIPADU
CHEBROLU
TENALI
TSUNDURU
MODUKURU
PONNURU
INTURU
REPALLE
APPIKATLA
BAPATLA R.S.
NIZAMPATAM
VETAPALEM R.S.
CHINNA GANJAM R.S.
BUCKINGHAM CANAL
GUDIVADA
ELLORE CANAL
BUDAMERU RIVER
RIVES CANAL
EAST BANK CANAL
BANK CANAL
MASULIPATAM CANAL
KISTNA RIVER
POLRAZ DRAIN
POLRAZ CANAL
PEDALANKA DRAIN
SANTUMILLI CANAL
GUDUVADA CANAL
KAVUTARAM
BELURUPADU
PARATALAMARRU
PEDDALANKA
PEDDAGOLLAPALEM
PEDDAPATNAM
MANGINAPUDI
MASULIPATAM
BANDAR
CHELLAPALLE
SIVAGANGA DRAIN
AVANIGADDA
KODURU
NAGAYALANKA
BAY OF BENGAL
REFERENCE
RIVERS
CANALS
DRAINS
ROADS
RAILWAY LINE

the Kistna river by an aqueduct known as the Campbell aqueduct. The aqueduct is the longest reinforced concrete aqueduct bridge in India and carries a roadway of 16 feet and a footpath 4 feet wide. The aqueduct is submerged by high floods. The system irrigates lands in Kistna district, cost about Rs. 58 lakhs, and returns about nine per cent on the outlay.

107. *Pennar system and Mopad reservoir.*—In the Nellore district, the Pennar has been harnessed for irrigation. The system consists of two anicuts, one at Sangam and the other at Nellore. Two canals take off at the Sangam anicut on the left, one to feed the Duvvur tank and other the large Kanigiri tank, one of the largest tanks in the Circars. The channel taking off at the right side of the anicut feeds the Nellore tank. At the Nellore anicut, a canal takes off on the right and feeds a number of tanks, the largest of which is the Sarvapalli tank. The Sangam anicut has recently been raised by one foot and fitted with two-feet falling shutters. The system irrigates about 146,600 acres in the Nellore district and costs about Rs. 71 lakhs, returning about nine per cent on the outlay. Further inland, the Mopad reservoir built in 1921 as a famine protective work, has fulfilled the purpose for which it was intended. The Mopad project consists of a reservoir with an earthen dam about seventy feet high at the deepest point and more than a mile long, built across the Manneru river. The reservoir has a capacity of about 2,100 million cubic feet and irrigates lands in a tract where famines were frequent. The tank was originally intended to irrigate a large area but owing to failure of supplies, its present ayacut has been fixed at about 7,000 acres, but actual irrigation is only about 2,300 acres. The system cost about Rs. 23 lakhs and returns 0·41 per cent on the outlay.

108. *Kurnool-Cuddapah Canal.*—The Ceded Districts are in the famine zone and are periodically liable to failure of rain and consequent shortage. The main source of irrigation to part of this tract is the Kurnool-Cuddapah canal. It takes off from the Tungabhadra from an anicut at Sunkesula about fifteen miles upstream of Kurnool. The canal irrigates about 76,500 acres in Kurnool and Cuddapah districts and runs parallel to the river for about fifty miles, when it takes a turn southwards towards Cuddapah district and pierces the ridge between the Pennar and the Kistna valleys through a cutting called the Mittakondala cutting. Below this point, the Kali and Kundu rivers are used to carry the canal supplies, the canal serving merely as a navigation canal. There are anicuts across the Kundu river at Santajuttur and at Rajoli where the canal supplies are again picked up and used for irrigation. At Adinimeyapalli, the canal crosses the Pennar and is continued on the right as far as Cuddapah town. The Kurnool-Cuddapah canal flows through black cotton soil and irrigates mostly dry crops. These crops do not require irrigation in years of good and well distributed rainfall but in bad years they require occasional irrigation. The canal is maintained at a heavy and recurring loss,

particularly because of its use in famine years. The canal was navigable throughout till 1934, when navigation in the canal below mile 74/0 was closed, as there was little boat traffic, and costly replacement of a number of lock gates was found necessary. The canal cost about Rs. 234 lakhs and returns about 0·87 per cent on outlay.

109. *Ponnair and Vellar systems.*—Advantage has been taken of the fact that the South Arcot district is traversed by two fairly large rivers, the Ponnair and the Vellar. In the Vellar, regulators combined with road bridges have been built at Toludur and Shatiatope. The Willingdon reservoir originally known as the Toludur project is a comparatively new work opened in 1923. There is a bridge regulator fitted with steel lift shutters across the Vellar at Toludur from which a canal three-and-a-half miles long takes off and feeds the Willingdon reservoir at Tittagudi with a capacity of about 2,400 million cubic feet. From the reservoir, a channel takes off and branches into the high and low channels, a short distance below the head, to irrigate about 25,000 acres. Irrigation is not fully developed and the system now irrigates about 20,000 acres. Development of the system is being hastened by providing new field channels. The supply channel from Vellar draws water only when surplus is available after meeting the requirements of the older irrigation systems on the Vellar below Toludur. The system cost about Rs. 26 lakhs and returns 3·78 per cent on the outlay. The Shatiatope anicut system is a combined tank and canal system served by the Vellar Rajan channel taking off from the Shatiatope anicut across the Vellar. The anicut is now a bridge regulator fitted with lift shutters. The system irrigates about 32,700 acres. The Perumal tank is the large terminal tank of the system. The system cost about Rs. 11 lakhs and returns about 8 per cent on the capital.

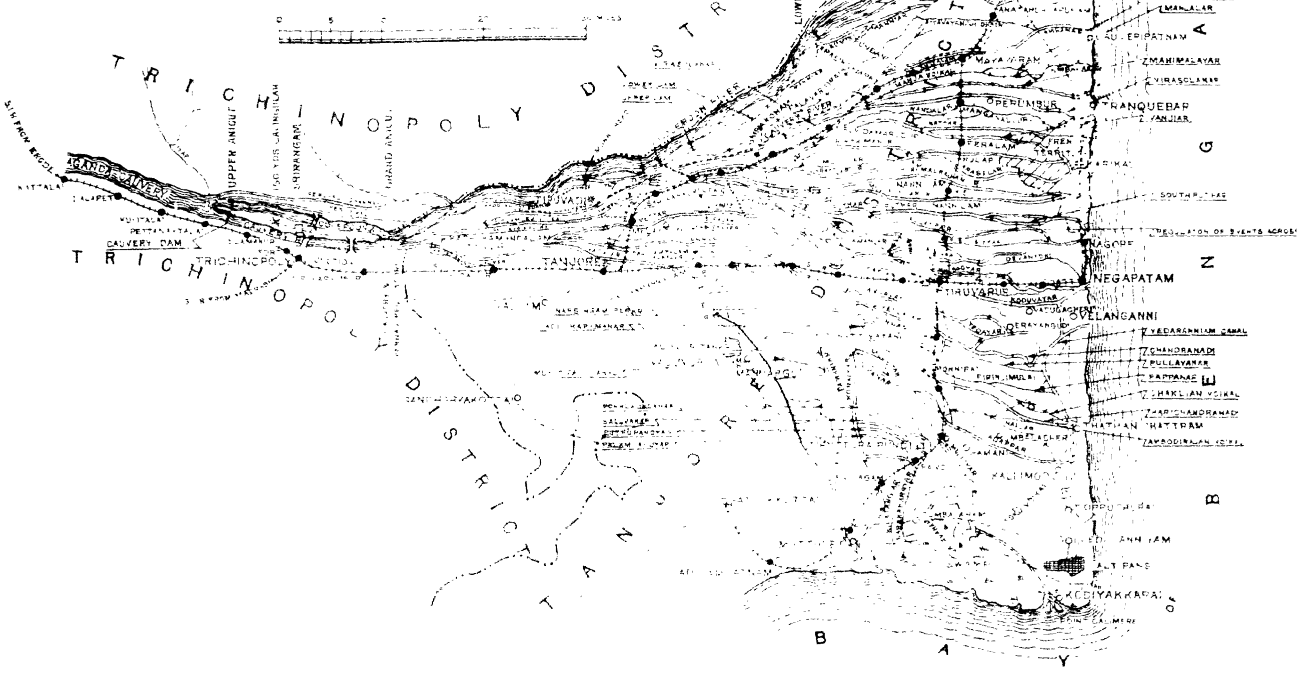
110. *Lower Colcroon system.*—The most important anicut system in the South Arcot district is the Lower Coleroon anicut system. It consists of two weirs built across the two branches of the Coleroon about 1840 by Sir Arthur Cotton to replace the system of old river channels having inadequate supplies. Since they were constructed, the crests of the weirs have been lowered and there is now a bridge regulator fitted with lift shutters of 33 feet 4 inches span and 8 feet in height. The Vadavar and North Rajan channels take off on the left side and irrigate lands in Chidambaram in the South Arcot district. The Kumikimaniyar and South Rajan channels take off on the right and irrigate lands in Shiyali in the Tanjore district. The Vadavar is a contour canal supplying the large Veeranam tank connected with the Vellar river through a sluice at its northern end. The system irrigates about 118,700 acres and cost about Rs. 30 lakhs, returning 4·02 per cent on the capital outlay.

111. *Palar system.*—The Palar river which rises in Mysore is the main feeder for North Arcot. Water is diverted through a series of canals and channels by the Palar anicut, fifteen miles from Vellore, to irrigate 83,000 acres. The district has many old

CAUVERY DELTA

SHOWING POSITIONS OF

THE PRINCIPAL IRRIGATION WORKS



tanks which have been retained and which now form an essential part of the system. Flow in the Palar is intermittent and the flood flow of the river is stored in the old tanks. The Poiney anicut in the same district irrigates over 36,000 acres.

112. *Barur anicut.*—The Salem district is not particularly favoured by nature. The largest irrigation scheme in it is in Barur. An anicut across the Ponniar river diverts water to the Barur reservoir which irrigates about 7,000 acres. The district depends mainly on tanks, many of which get a supply over and above that contributed by their own catchments through channels taking off from anicuts built across adjacent streams. Though the Mettur reservoir is in the district, it has not been possible due to very unfavourable conditions to devise any scheme to benefit Salem from this source. The Cauvery channels in Namakkal taluk, however, irrigate 7,000 acres of very rich and fertile lands.

113. *Cauvery system.*—The Cauvery irrigation system deserves special mention. Its unique features have been properly studied and understood by very few. The Cauvery rises in the Western Ghats near Mercara in Coorg. The Western Ghats receive heavy rainfall during the south-west monsoon, the highest run-off being in July and August. Near Mysore, the river is spanned by the Krishnaraja Sagara Dam, with a capacity of 44,827 million cubic feet. The dam impounds water for irrigation, besides ensuring a steady supply necessary for generating power at Sivasamudram lower down the river. After leaving the Mysore plateau, the river winds its way through hilly country, and the Mettur Dam is constructed 78 miles below the Krishnaraja Sagara before the river enters the plains. The Mettur Dam provides for a net capacity of 93,500 million cubic feet. From Mettur onwards, the catchment of the Cauvery is subject to the north-east monsoon, the high floods due to this monsoon occurring in November. This sequence of rainfall over both the main monsoon periods conduces to a fairly high flow in the river during the irrigation season of June to January except during the short interval between the two monsoons. Irrigation from the Cauvery in this reach is confined to narrow fringes of land adjoining the river, water being taken to the fields by means of channels running parallel to the river. The head of the Cauvery delta proper is the Upper Anicut 10 miles west of Trichinopoly. At this place, the river bifurcates into two branches of which the northern takes the name of Coleroon and the southern retains the name of Cauvery. The northern arm carries the bulk of the flood waters to the sea while the southern arm is the main channel for the supply of irrigation water to the delta. The important irrigation work on the Cauvery at the head of the delta is the Grand Anicut. This is the oldest work in the delta built many centuries ago by the Chola kings. The anicut itself consists of a core of roughly dressed granite in mud covered on the outside with a facing of roughly dressed granite in mortar. It is an amazing tribute to the wisdom and skill of the ancient engineers who built this anicut that it is still functioning at the present day

Below the Grand Anicut, the Cauvery river branches into numerous arms that irrigate between them over a million acres. More recently after the construction of the Mettur Dam in 1933, irrigation has been expanded to certain of the non-deltaic tracts of the Tanjore district. It is significant that with a river which has mainly a south-west monsoon supply in which the high flow is confined to less than two months in the year and without a reservoir (till one was built in 1933) more than 80 per cent of the waters of the river have been utilized for irrigation in the Tanjore delta. This feat has been achieved by a successful system under which irrigation and drainage are combined. This goes against accepted theories of irrigation of the present time but a failure to appreciate the circumstances, under which this combination has taken place in the Tanjore delta, has been responsible for a great deal of ignorant application of modern ideas by theoretical engineers. The old channels in the delta had no head sluices—they were of the inundation type. The channels have been so designed as to take in very much more water than is necessary for the land irrigated under any one of them. The result is that when there is plenty of water in the river these channels take in these waters and distribute them among the various fields under them. Thus instead of the river water being allowed to go to the sea they are distributed amongst millions of fields in the delta. In the fields themselves, an ingenious system has been devised under which the drainage channel of the upper village is the irrigation source for the lower village. The result is that the waters conserved in the upper village are gradually passed on to the villages lower down. In times of flood, these channels, which take water from the river, distribute the risk of flood over the entire delta instead of allowing the waters to be concentrated in any particular spot, and when the river level goes down these very channels drain the waters gradually back into the river. This system involves a graduation in the period of cultivation from the head of the delta towards the tail-end, i.e., cultivation at the head will start in the beginning of June but by the time the water reaches the tail-end it would be very nearly the middle of August. That is why the double-crop lands in the Tanjore delta are situated in the upper reaches. The delta thus utilizes the waters of the south-west monsoon brought down by the river in such a way that not only very little of it is wasted into the sea but also its use is spread over as long a period as possible, till in fact the beginning of September. The lean period in the Tanjore delta is the month of September. From the middle of October, the north-east monsoon affords the rains necessary for maturing the crop. The old system of irrigation in Tanjore may be described in one sentence by saying that under this system every field acts as a reservoir and an insurance against floods. The area irrigated under the Cauvery delta system is about 870,000 acres (first crop) and just over one million acres including the second crop. The value of the crops raised in the area is estimated at about Rs. 11·14 crores. The Government have spent over Rs. 85 lakhs for improving the system since it was taken over from the Tanjore kings. The

system yields a return of about 10 per cent on the capital outlay after giving credit for about Rs. 38 lakhs to old revenue. The Mettur Reservoir has helped in steadying the supply of water and incidentally has rendered some of the large channels unnecessary. The "new delta" extensions are under development and now irrigate about 176,000 acres. The capital outlay is Rs. 6·5 crores and the present rate of return on capital works out to 2·71 per cent.

114. *Periyar system.*—The Madura district benefits mainly from the Periyar project. Its main feature is the diversion across the peninsula into the Bay of Bengal of a large river which nature had ordained should flow into the Arabian Sea. A huge dam across an inaccessible gorge in Travancore about 3,000 feet above the sea, in malaria-ridden jungle, forms a picturesque lake set in the hills. A tunnel 5,700 feet long, has been bored through the eastern ranges of the hills to carry the waters of the lake to the plains of Madura. The dam is of concrete with a masonry facing on water side about 170 feet high above the riverbed at the deepest point. After it passes the tunnel, water is let into the Suruliyar, a tributary of the Vaigai. After irrigating about 12,700 acres in the Suruliyar valley, it is again picked up at the Perani regulator across the Vaigai about 80 miles down stream of the tunnel and flows into the Periyar main canal about 35 miles long. The system irrigates about 126,000 acres in the Madura district. The lake has a gross capacity of about 15,700 million cubic feet and a useful capacity of about 9,800 million cubic feet. The system cost about Rs. 108 lakhs and returns about 6 per cent on the capital outlay.

115. *Tambraparni system.*—The Tinnevelly district, which adjoins Madura, depends mainly on the Tambraparni river across which several anicuts have been built to irrigate 75,000 acres. The most important is the Srivaikuntam anicut from which two channels take off. On the left is the north main channel feeding a series of tanks and finally emptying into the Korumpallam tank, which supplies Tuticorin. On the right side, the south main channel takes off and supplies the large Kadamba tank and a series of tanks below it. Supplies reach as far as Tiruchendur with its famous temple on the seashore. The system irrigates about 24,700 acres, cost about Rs. 18 lakhs and returns 4 per cent on the outlay.

Progress of Irrigation in Madras

116. Madras with its 30 canal projects, 22 reservoir projects, 33,086 tanks and 728,092 wells has facilities to irrigate annually between 11 and 12 million acres of crops. In the development of its irrigation system, the Province ranks third in India, the Punjab and the United Provinces having larger areas under irrigation. The total area under irrigated crops in all India is about

54 million acres and Madras contributes more than one-fifth of the area—

Year.	British India—Area irrigated. in acres.	Madras. Area cultivated in acres.	Madras. Area irrigated in acres.
(1)	(2)	(3)	(4)
1901–02[1]	44,098,000	36,574,000	10,532,000
1921–22[2]	47,7[illegible]9,679	33,041,655	11,418,042
1931–32[2]	48,728,580	33,495,798	11,184,259
1943–44	52,832,596[3]	37,704,612[4]	11,839,898[4]

NOTE.—The areas cultivated and irrigated are gross areas, that is, areas which are sown twice or twice irrigated are included twice over.

From the table, it is seen that the progress of irrigation in Madras has not been spectacular in the four decades. Moreover, progress has been slow, compared with some other Provinces. In the Punjab, for instance, the area rose from 10,130,000 acres in 1901–02 to 16,139,943 acres in 1937–38, an increase of nearly 60 per cent. In Sind also there has been some remarkable progress though not to the same extent as in the Punjab. It may, however, be mentioned that though there has not been much expansion during the period, costly schemes have been put through in Madras, like the Mettur project, which are intended to strengthen and increase the efficiency of existing irrigation works.

117. *Productive irrigation works.*—[5] There are 24 productive irrigation works in the Province with a total capital outlay (direct and indirect) of Rs. 15,37,45,818 on 31st March 1944. The gross revenue of the year was Rs. 2,42,99,202 and the working expenses amounted to Rs. 58,08,216. The net revenue derived and the net profits after deducting interest charges amounted to Rs. 1,39,55,656 and Rs. 73,55,051 which works out to 4·78 per cent on the total capital outlay. The total value of crops raised from these irrigation schemes totalled 48 crores of rupees. A statement showing the productive irrigation works with the extent of their areas is given in Appendix 5.

118. *Unproductive or protective irrigation systems.*—There are 32 unproductive or protective irrigation works in the Province. The total capital outlay invested on all these schemes direct and indirect is Rs. 4,18,57,550 as on 31st March 1944. The gross receipts totalled only Rs. 16,82,269 out of which working expenses amounted to Rs. 8,04,994. The net revenue was Rs. 5,46,060 representing a return of 1·30 per cent on the capital outlay. The value of crops raised was Rs. 4,17,81,379. Particulars of the unproductive irrigation works with the extent of their areas are given in Appendix 6. The total capital investment in productive and unproductive works in the Province exceeds Rs. 19 crores and they annually irrigate about 4½ million acres.

[1] Indian Irrigation Commission Report, 1901–03, Part I—General.
[2] Agricultural Statistics of British India, 1937–38—Volume I.
[3] 1937–38 figures.
[4] Season and crop report.
[5] Administration Report of the Chief Engineer for Irrigation, 1943–44.

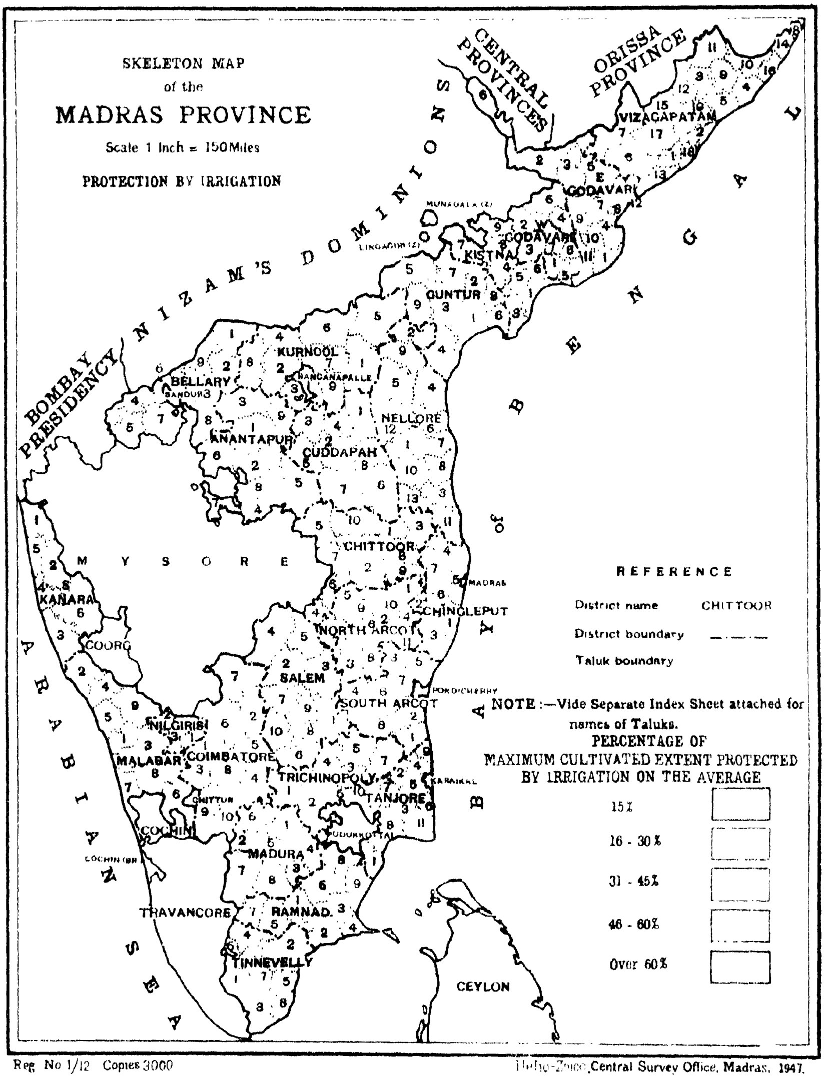


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Photo-Zinco, Central Survey Office, Madras, 1947.

119. *Minor irrigation works.*—Minor works, of which there are nearly 35,000 in this Province, are an important source of irrigation. Their importance is not often recognized because they are small in size and are scattered all over the countryside and are not spectacular like the huge reservoir or anicut systems. But their value as a protection factor against crop failure is inestimable. They are generally found in the " dry " upland districts—just where, but for them, the crops would be completely dependent on the capricious rainfall. They are thus " pockets " of insurance against crop failure and deserve much more attention than has been bestowed hitherto. They consist of small tanks or river channels, both Government and private, and annually irrigate an area very nearly equal to that irrigated by the major systems. The areas irrigated by minor irrigation works in 1944–45 totalled 3,737,311 acres as follows :—

Tanks ..	3,175,303	Other sources like spring channels.	291,520
Private channels ..	270,488		
		Total ..	3,737,311

It is seen that tanks are the most important sources of irrigation under minor works. The Province has a total of 33,086 tanks of which 28,756 tanks are Government owned and 4,330 are private owned. The largest number of tanks is found in the Madura, Chittoor, the North and South Arcots and the Chingleput districts. The Famine Commission of 1880 discussed fully the subject of the maintenance of the numerous small tanks and river channels, on which irrigation of such a large area depended. The Commission recommended that a scheme should be framed for systematically putting the tanks in repair. The recommendation was adopted by the Government and the restoration of tanks has been steadily pursued since 1883, when operations commenced in the Madura district. Considerable progress was achieved by the time the Irrigation Commission reported in 1903. That Commission strongly recommended that the work of tank restoration should be more vigorously prosecuted and that the grants for the maintenance of minor works be increased until it was completed. Up to date, nearly Rs. 2½ crores have been spent on restoration of tanks. [1] The total area coming within the scope of the tank restoration scheme investigation is 102,500 square miles in this Province. Investigations were taken up in basins comprising an area of 94,660 square miles of which 87,360 square miles had been investigated up to 1931, when the tank restoration divisions and subdivisions were abolished as a measure of retrenchment. Since April 1931 up to end of March 1944, an area of 1,284 square miles has been, however, investigated bringing the total area to 88,914

[1] Administration Report of the Public Works Department, 1943–44, Part II—Irrigation, page 25.

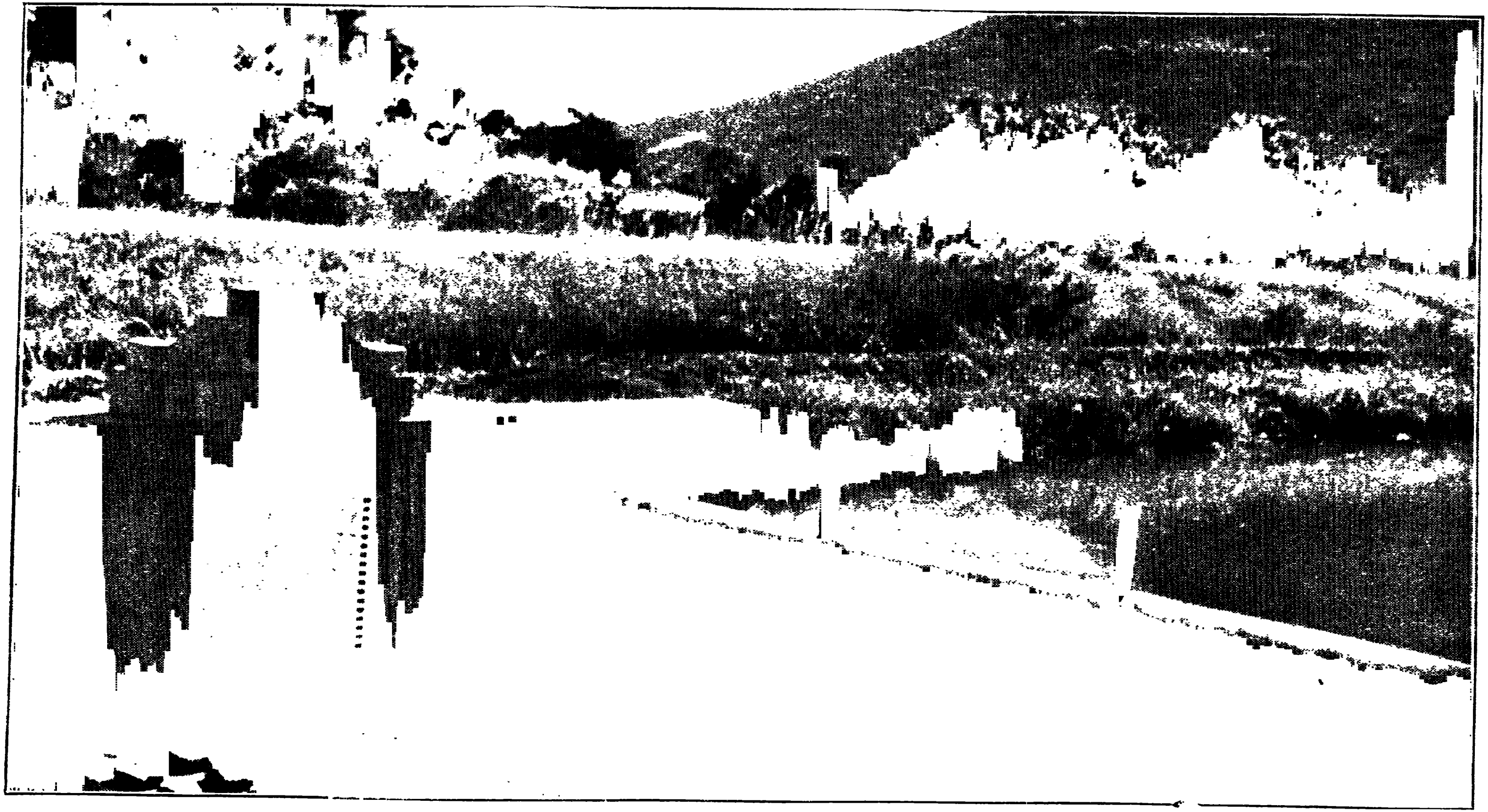
square miles, covering nearly 87 per cent of the area to be investigated. The special subdivision for tank restoration schemes was restored in March 1941 and they are continuing investigation now.

120. All Government works irrigating less than 200 acres, except those which have been transferred to the Public Works department for special reasons, are in charge of the Minor Irrigation department which works under the Collector of the district and is in effect a subordinate branch of the Revenue department. A more detailed note on minor irrigation works is given in Appendix 7. It represents the results of certain investigation that the writer conducted a few years ago. It contains several constructive suggestions which may be usefully tried. The suggestions have been tested and found successful by the present writer in the Salem district.

Expansion of Irrigation

121. Of the schemes for the expansion of irrigation in the Province, the two most important are the Tungabhadra Project and the Godavari Project. The former has already been sanctioned after a long and chequered history dating back to nearly 100 years while the latter is still in a stage of active investigation.

122. *Tungabhadra Scheme.*—The scheme is for the construction of a reservoir across the Tungabhadra river at Mallapuram near Hospet, jointly by the Madras and the Hyderabad Governments. The cost of construction will be borne equally by the two Governments. The cost to the Madras Government including the canals is estimated at about Rs. 10 crores and the scheme is expected to be completed in eight years but water for irrigation will be available after six years. The area to be irrigated on the Madras side is about four lakhs of acres in the Bellary and Kurnool districts. Each Government will be entitled to draw off 65,000 million cubic feet of water from the reservoir. Any increase in the quantity will be examined after ten years or such later date as the Governments may agree to, considering the needs of the project. The two Governments may also develop power out of the supplies from the reservoir. They have also agreed to have the dam constructed to impound a sufficient quantity for a larger eventual utilization than now proposed. Out of the commandable area, 10 per cent will be under wet crops and the rest under dry crops. This 10 per cent area will receive continual irrigation for rice. Irrigation for the remaining area will be occasional, once about a fortnight. It has been found that irrigation from the Tungabhadra waters will not have any deleterious effect on the black cotton soil of the Ceded Districts. Dry crops like millets, cotton and groundnut yield when irrigated three to four times the quantity obtained when unirrigated. Apart from the introduction of improved varieties to be cultivated with irrigation, the increase in the quantity of crop is itself the main benefit to be obtained from



EXPERIMENTAL MODEL OF PROPOSED DAM ACROSS TUNGABHADRA RIVER

the scheme and this will be assured year after year without depending on the occurrence of a normal rainfall. It has also been found that a variety of long staple cotton evolved at the Coimbatore Agricultural College grows very well in the Ceded Districts under irrigation. At present short and medium staple cotton alone are grown. With occasional irrigation, long staple cotton yielding 1,200 lb. per acre and fetching more than double the price of short staple cotton can be grown. The area to be benefited by the project both on the Madras and the Hyderabad sides, is liable to be afflicted with famines frequently. In 1942–43, the Madras Government had to spend Rs. 2½ crores on famine relief in the Ceded Districts. The execution of the project will provide employment for the labourers in the Ceded Districts, if there should be a recurrence of famine during the construction of the project. After execution, the area commanded by the project will be saved permanently from famine.

123. *Godavari Scheme.*—This scheme is for the construction of a reservoir across the Godavari with a dam about 20 miles above the town of Rajahmundry. This reservoir originally called the " Polavaram Reservoir ", because the dam would lie within the village of Polavaram on the right bank of the Godavari, is now known as the " Ramapadasagar Reservoir " for the reason that the waters of the reservoir will lap the feet of Sri Rama at the Bhadrachalam temple 74 miles above the proposed dam. A preliminary investigation of the scheme revealed promising results and its detailed investigation has been undertaken at a cost of Rs. 11·41 lakhs and is expected to be completed by the end of 1946. The magnitude and the usefulness of the project will be evident from the fact that it will affect five districts, namely, Guntur, Kistna, East Godavari, West Godavari and Vizagapatam. The project will utilize 20 per cent of the waters of the Godavari, while only 7 or 8 per cent thereof is utilized at present. It will supply water to 23·5 lakhs of acres of new irrigation of paddy in addition to providing a steady supply to about 21 lakhs of acres of old irrigation in the Godavari and the Kistna deltas. This will yield an additional quantity of about a million tons of rice. With this additional production of rice, it will be normally possible to dispense with all the pre-war imports of rice from Burma to the Madras Province and the States of Travancore and Cochin, which amounted to 8 lakhs of tons of the value of about Rs. 20 crores at the present rates. Famine in India is primarily a famine of rice and not of wheat, and the project will substantially help to abolish famine in India. The scheme provides for 170 miles of navigable canals, joining the Vizagapatam harbour and the Kistna river and makes the Godavari river navigable for about 120 miles. Another important feature of the scheme is the development of firm continuous hydro-electric power to the tune of 75,000 K.V.A. The execution of the project is therefore an urgent necessity and the Madras Government are taking the requisite steps to start work on the project at the end

of 1946. The project will provide work for 50,000 demobilised personnel during the first five years and a large labour force will be employed till the completion of the project in about 12 years' time. Thereafter labour will be required for the cultivation of the land under the project. The net cost of the project is estimated at Rs. 63 crores. The net revenue, without taking into account indirect revenue, from the project is estimated at Rs. 2·35 crores besides an estimated receipt of Rs. 2·42 crores by way of inclusion fees at Rs. 25 per acre. On the present estimate, the net direct revenue will yield a return of 3·7 per cent per annum on the net capital outlay and the project will pay its way if it can be financed out of loan money carrying interest at 3·25 per cent per annum.

124. *Other irrigation projects.*—The other projects which have been recently investigated are the following :—

Name of project.	District.	Cost in lakhs.	Estimated ayacut.
(1)	(2)	(3)	(4)
		RS.	ACS.
Lower Bhavani	Coimbatore ..	267	207,000
Gandikota Reservoir	Nellore and Cuddapah.	325	250,000
Drainage rectification of Kistna and Godavari.	Kistna, West Godavari.	220	72,000
Gundlacamma Project	Guntur ..	62	28,500
Vaigai Reservoir	Madura ..	100	40,000
Coringa Island Project	East Godavari ..	14	8,000
Atleru Reservoir Scheme	Nellore	25	4,300
Pulikonda Project	Guntur ..	27	12,000
Upper Pennar Project	Anantapur ..	24	14,250
Gazuladinne Project	Kurnool ..	24	13,950
Kattalai channel	Trichinopoly ..	53	15,000
Rallappad Scheme	Nellore ..	23	11,000
Pullambadi Project	Trichinopoly ..	49	14,000
	Total ..	1,213	690,000

125. The Grow More Food Campaign has given a fillip to irrigation schemes. [1]Up to 31st March 1945, the Government have sanctioned 72 " Grow More Food " irrigation works (vide Appendix 8) costing about Rs. 89·43 lakhs. The schemes taken up for execution are expected to bring about 51,000 acres of new lands under irrigation. The Government have also sanctioned another scheme for the reclamation of large areas of unirrigated lands in the Pattukottai taluk of Tanjore district in the new Cauvery-Mettur Project area. It is expected that under the scheme about 80,000 acres will be brought under irrigation. The schemes either sanctioned or under investigation when completed are expected to bring about 4 million acres more under irrigation. This will increase the proportion of the irrigated area to the net area cropped to 42 per cent, from the present proportion of 30 per cent.

[1] Grow More Food Bulletin, 1945, page 16.

Irrigation from wells

126. An important source of irrigation in this Province are the wells. Over one and three quarter million acres are irrigated by water lifted from wells which represents approximately 15 per cent of the total irrigated area of the Province. In British India, as a whole, about 5 per cent of the cropped area is irrigated from wells. Among the Provinces, well irrigation is most important in the United Provinces where over a million wells in use irrigate over 5 million acres of land. In the Punjab, though the number of wells is small being only over 3 lakhs, the area irrigated exceeds 4 million acres. Madras thus holds the third place in well irrigation. A significant feature is the capacity of the wells in the different provinces. In the Punjab, each well has a very large capacity, the average being 13 acres. The most favourable conditions for the development of wells are found in that Province in the alluvial plains where the subsoil contains an inexhaustible supply of water. [1] In this broad zone of the plains, water is usually found close to the surface and a well can be easily sunk through soft and pervious strata. On the contrary, the United Provinces wells are small, and irrigate only small areas of 2 acres each on an average. Wells in South India present entirely different features. A large number of them are sunk in hard ground with a foundation of rock or in rock itself. In the Deccan black soil tracts, the water table is very low and irrigation from wells hardly pays. Water-supply at reasonable depth is to some extent available only in the south-east coastal areas. Comparing the efficiency of the wells in the North and South, the Punjab decidedly scores. With the cold winter climate of Northern India and the rich alluvial soils highly retentive of moisture, very few waterings are required to bring the crop to maturity, whereas in the South, the climate is warm and the sun powerful throughout the year and frequent waterings are necessary to mature the crop. Therefore in the south, it does not pay to irrigate from wells unless a heavy outturn of produce is expected from the field. Intensive cultivation methods and heavy manuring are therefore common features in all the well irrigated garden lands of the Province.

Distribution of wells

127. The following statement shows the distribution of wells in the Madras Province :—

Distribution of wells in the Madras Province

Name of districts.	Number of wells.	Area irrigated.
		ACS.
Vizagapatam	5,409	69,289
East Godavari	199	..
West Godavari	1,420	7,998
Kistna	1,340	9,311

[1] Report of the Indian Irrigation Commission, 1901–1903, Part I, page 49.

Name of districts.	Number of wells.	Area irrigated.
		ACS.
Guntur	6,022	19,584
Kurnool	5,206	27,589
Bellary	5,157	7,665
Anantapur	28,405	56,029
Cuddapah	29,530	75,506
Nellore	13,388	110,873
Chingleput	19,847	44,748
South Arcot	49,110	88,159
Chittoor	31,980	76,185
North Arcot	130,148	158,128
Salem	94,062	197,958
Coimbatore	100,939	397,217
Trichinopoly	74,370	94,613
Tanjore	25,356	12,315
Madura	46,787	122,580
Ramnad	18,719	59,827
Tinnevelly	40,698	105,401
Total ..	728,092	1,740,975

The North Arcot, Coimbatore and Salem districts have between them 45 per cent of the total number of wells. Lift irrigation and intensive cultivation are the rule in these districts and commercial crops like Cambodia cotton, groundnut and tobacco are the main crops raised under these wells.

In the two west coast districts, where the rainfall is always heavy, there are no irrigation wells, worth mentioning; so too in the district of Vizagapatam and the three deltaic districts of Godavari, Kistna and Tanjore. In the Deccan districts well sinking is difficult and expensive and hence the number of wells is not considerable.

Development of well irrigation

128. The development of well irrigation in Madras is largely attributed to the liberal policy which has been pursued for the last one century in regard to the exemption of private improvements from additional taxation. This principle was first advocated by Sir Thomas Munro and his recommendation bore fruit in the decision not to assess wells so as to raise the assessment over what the general value and character of the land would warrant. Orders were issued, giving a distinct assurance, that the ryots would be allowed the full benefit of their own improvements, that the lands improved would not be subject to any additional assessment so long as the general rates of the district remained unaltered, and that on the occasion of any general revision of the district rates, the assessment of the lands so improved would be irrespective of the increased value due to improvements made by their holders. Another and more recent contributory factor is the availability of power from small oil engines from the beginning of this century

and later the availability of cheap hydro-electric power. These have enabled the ryots to deepen wells to a depth where bullocks cannot ordinarily be used for lifting water, and thereby obtain larger supplies. In the whole Province, there are now 3,690 oil engines, used for lift irrigation, largely concentrated in the South Arcot, Coimbatore, Salem and Chingleput districts. Hydro-electric power is largely connected now to rural areas and ryots have been quick in taking advantage of this cheap power. In 1944, there were 4,307 electric pumps for agricultural purposes in the Province, mostly for pumping water for irrigation. There has been a set-back in lift irrigation by hydro-electric power due to non-availability of electrical goods and with their free availability in the coming years, the extension and utilization of electric power for agricultural pumping will be greatly increased. The high prices for draught bullocks will also largely contribute to hasten this development. There is considerable scope for the extension of well irrigation in the Province. Though the progress of well irrigation in Madras was rapid in the early part of the century, progress has been slow during the last two decades. This has been largely due to lack of finance on the part of the agriculturist and the uncertainties attached to well sinking in finding water. It is a gamble in many respects especially as no intensive surveys have been made of the underground water resources of the Province. The Industries Department have studied the underground water resources in certain districts of the Province, but the ryot has not been greatly benefited. There is no organization to properly advise him whether it is safe for him to invest large capital (especially when borrowed) on such an uncertain gamble as well digging.

129. [1] The Irrigation Commission in 1903 examined what special steps the Government should take to facilitate the extension of well irrigation. Their recommendations were mainly (1) the liberalization of takkavi loans and free grants in special localities, (2) sharing of risks with the cultivator when there is a failure to find water by allowing a partial remission of money which may have been advanced, (3) conducting trial borings and sub-soil surveys and (4) providing tools and boring equipment on hire to assist in well-digging. To a large extent all these recommendations have been given effect to, but there is need for further liberalization in the issue of loans on more favourable terms. Now the digging of wells is left to the initiative of the cultivator. There is no reason why the initiative should not be taken by a Government peripatetic party who can advise ryots to take up well-digging in suitable lands and help them with the required materials and finance. The Government should also supply actual machinery (e.g., electrical pumps) and recover the cost on the instalment system. This will go a long way in breaking the lethargic attitude of the cultivators. When large sums of the tax-payers' money are sunk in irrigation projects to benefit ryots in certain areas, it is but proper that the

[1] **Report of the Indian Irrigation Commission, 1901–03, Part I, pages 53–54.**

Government should extend financial assistance to ryots in other less fortunately placed areas for the development of well irrigation. Wells in villages in the absence of seasonal rains, are the *sinc-qua non* for the progress of agriculture and the Government have from time to time sanctioned subsidies to put into execution some scheme or other to sink new wells and repair old ones and deepen them. Not quite satisfied with the progress made so far in the matter of sinking wells for the use of villagers for irrigation purposes, the Government had sanctioned a scheme known as Accelerated Wells Scheme which envisaged quicker action in the matter. For the period ending 30th September 1946, the total amount of subsidies paid for the sinking of new wells under the above-mentioned scheme is Rs. 1,85,30,748 and Rs. 47,15,578 for renovating old wells which had fallen into disuse. The number of wells for which subsidies have been granted by the Government is 61,439. Thirty thousand five hundred and sixty-three old wells have also been subsidised. Up to 30th September 1946, 26,291 new wells have been sunk and 14,248 old wells have been repaired. The work regarding 32,029 new wells and 14,655 old wells is in progress.

Irrigation dues and method of charging water rates

130. The one defect that is common in all irrigation systems is the absence of any inducement to economy in the use of water by the cultivator. [1] " Judged however by modern scientific standards, there is generally a great loss of water due to wasteful and unscientific application and there is room for improvement in the matter of getting the most out of the available supply without deterioration of the fertility of the soil." The ultimate solution of the problem of wasting water must be found in a system of charging for water by volume. The matter has been interesting irrigation authorities from the time of the Irrigation Commission but it was found impossible to measure the quantity flowing into each field or even from a single branch channel or sluice. It is considered that the conditions in this country are not yet sufficiently developed to institute a system of water charges based on measure. The basis adopted for charging for water is the area irrigated. For lands registered as " wet " the water charge is consolidated in the land revenue. In " dry " lands, a separate water charge is levied.

The water rates in force under the several productive and unproductive works vary widely according to the source of irrigation. For a single wet crop, the rate varies from Rs. 4 to Rs. 9–6–0. For a second wet crop raised in the same land, the rate is generally one-half of the first crop rate. For dufassal crops like sugarcane, betel or turmeric which naturally remain on the ground for more than six months, the rate ranges from Rs. 6–4–0 to Rs. 14–1–0. For irrigation under the Godavari and the Kistna canals, the water rate is Rs. 6–4–0 for the first wet crop, Rs. 3–2–0 for the second crop and Rs. 9–6–0 for a dufassal crop. For the

[1] Royal Commission on Agriculture in India (Evidence), Volume III, page 268.

Cauvery delta special rates have been fixed in the Tanjore District Cauvery Water-cess Rules. Under these rules, when water is supplied through the Grand Anicut canal system or the Vadavar system for regular irrigation of crops, the rate is Rs. 15 for a first irrigated crop, Rs. 7–8–0 for a second irrigated crop and Rs. 3–12–0 for a third irrigated crop. For a dufassal crop the rate is Rs. 22–8–0 per acre but these rates have not yet been brought into effect. The water rates per acre in force under the various productive and unproductive works and in the Cauvery delta are given in Appendix 9.

Irrigation Administration

131. Before the Montford Reforms the Government of India were the owners of the major irrigation works and the Provincial Governments were mere agents for supervising the working of the irrigation works. The Government of India, by raising loans in the open market or otherwise, provided all the irrigation finance. Since the Montford Reforms, irrigation is a Provincial subject and under the new arrangement Provincial Governments are given wide powers for sanction and execution of irrigation projects. They are permitted to execute works, the cost of which does not exceed Rs. 50 lakhs and the sanction of the Governor-General and the Secretary of State is required only when the project affects the interests of more than one Provincial Government or when the cost exceeds Rs. 50 lakhs. The sanction of the Secretary of State is also necessary when a revised estimate exceeds by 15 per cent the sanctioned original estimate. In this Presidency, the development of irrigation is watched by the Irrigation Development Board which was specially constituted for the purpose in 1930. The Board consists of two members of the Board of Revenue, the Chief Engineer (Irrigation) and the Director of Agriculture. The Board can summon any other head of department during the consideration of a particular subject if necessary. It meets once a quarter. All irrigation proposals and projects are examined and reported upon by the Irrigation Development Board before they are submitted to the Government for their consideration. The irrigation systems are in general administered by the Chief Engineer for Irrigation.

Irrigation Research

132. The technique of production at the highest pitch of efficiency is only attained by research. Irrigation research received but tardy attention in this Province till very recently. The Government have just recognized the need for irrigation research and have appointed an Irrigation Research Engineer to attend to problems connected with the supply and use of water in crop production.

Irrigation Law

133. The existing Irrigation Law is laid down in the Madras Irrigation Cess Act, 1865, as amended by the Madras Act VI of 1940, the Madras Compulsory Labour Act, 1858, and the Madras

Estates Land Act, 1908. The provisions of these enactments are found to be inadequate to meet practical difficulties in administration. There is need for a precise and comprehensive enactment enabling the State to control and regulate irrigation in the interests of the general community. The need for legislation in order to define the position of the State in respect of irrigation appears to have been recognized as early as 1866, when the Governor-General directed the drafting of an Act to set out "what was clearly the common law of the country, viz., the rivers and the natural streams as well as springs in unoccupied or Government lands belong to Government." The Bill prepared in pursuance of that order not only contained a declaration to that effect but also enunciated "the undoubted right of the Government to levy a reasonable tax" for the use of water from the sources mentioned. The Bill was not, however, proceeded with as the urgency for it was not then keenly felt. The subject was considered again in 1880 as a result of the Famine Commission Report which drew pointed attention to the great inconvenience caused by the absence of an Irrigation Law. In 1884, a new Bill, based substantially on the Bombay Irrigation Act of 1879 was introduced in the Madras Legislative Council with the object of establishing the law relating to irrigation and navigable works. The Bill was amended by a select committee whose report was not, however, unanimous and the Bill was not proceeded with. Again in 1898, at the instance of the Government, the Board of Revenue submitted an exhaustive report on the subject. Just then the Irrigation Commission stressed the need for an Irrigation Law for Madras.[1] Accordingly the Government placed an officer on special duty for drafting an Irrigation Bill. The Bill was drafted and it was to have been presented to the Legislature in November 1914. But, the consideration of the Bill was deferred till after the World War I. The Bill of 1914 was further revised and brought up again before the Legislative Council in 1923. It was rejected. A committee of non-officials was then appointed to examine its provisions and in the light of their recommendations the Bill underwent further revision. But it was again withheld.

134. The question was taken up by the Government again in 1939. The Board of Revenue was asked to indicate clearly in consultation with the Chief Engineer for Irrigation the rights which should be allowed by the Government, and the powers which should be assumed by them in the matter of distribution and control of supplies, the extent to which irrigation free of charge or at concessional rates should be allowed and other connected particulars. The matter was again deferred till after the World War II. Thus we see that though the question of enacting a comprehensive Irrigation Law has been engaging the attention of the authorities for about a century, no real progress has been made; but during this period, Case Law has been allowed to develop, restricting step

[1] Report of the Indian Irrigation Commission, 1901-03, Part II, pages 114-118

by step the powers of the Government in the matter of control and regulation of water-supply. Even though the courts have held that a certain paramount right vests in the Government in the matter of control of irrigation supply, the extent of that paramount right has nowhere been clearly defined. Without such a definition it would be difficult for the administrative and technical officers of the Government to decide for themselves whether in passing certain orders they are acting within that paramount right or not.

135. The lines on which a comprehensive Irrigation Law may be brought into being are indicated below :—The various classes of landholders whose irrigation rights should be defined are (1) ryotwari landholders, (2) landholders of permanently settled estates and (3) holders of inams granted under Inam Rules. It has been generally recognized that the Government have the paramount right to distribute and control supplies of water from the irrigation sources belonging to them. This recognition, however, does not prevent civil courts from issuing injunctions and declarations freely when ryots apprehend that their interests are affected.

For instance the question was raised whether the Government were entitled under the Act to levy enhanced water-cess in respect of irrigation of land registered under a particular Government work by reason of the fact that the ryot stored the water flowing from that work on to his land in a private reservoir. The Madras High Court decided that impounding of water on the ryots' own land flowing on to that land from the registered source in the authorized manner could not be held to create a different or additional source other than that assigned by the revenue authorities. The point is that the Indian Contract Act does not provide sufficient safeguards to meet such cases. There have been other instances also of a similar nature. In respect of Government water flowing on the ryotwari lands the paramountcy of the Government needs to be defined clearly.

Major irrigation problems arise in regard to the right of landholders over irrigation sources. In what is known as the 'Urlam' case, the Court held that the zamindar is entitled for the full use of water flowing in the channel situated in his estate and that the easement right enjoyed by him is not limited to the cultivation of the 'mamul' or customary extent of single-crop and double-crop land. It is now too late in the day to question the correctness of this legal position. But there are two directions in which legislation is still necessary, while accepting the proprietary right of the zamindars in the sources lying within the ambit of the zamindari. They are (1) to define and effectively enforce the obligations of ownership, viz., (*a*) upkeep of sources in an efficient condition and (*b*) co-operation with fellow owners in a system of connected sources for purposes of regulation of supplies and development of irrigation, and (2) assumption of control by the Government where necessary in the public interests.

The Madras High Court has held that the principle of the 'Urlam' decision applies to inam villages also. It will be

necessary to undertake legislation to enable the Government to exercise proper control over the distribution of water to inam ryots. The object of the legislation should be, as in the case of zamindars, to define and effectively enforce the obligations of ownership and to provide for assumption of direct control by the Government in necessary cases. As inams are generally small in extent and are interspread with Government villages and as the inamdars have slender financial resources, Government intervention in the general interest will be called for to a larger extent in the inams than in the zamindaris. Another question connected with the distribution and control of water is the need for a statutory record of irrigation rights before a project is executed. The Government should also have power to declare whether and to what extent the project has—

(*a*) improved pre-project supply to any source including a private source, and

(*b*) improved pre-project supply to any land, where supply has been afforded in lieu of or in addition to supply derived from a pre-project source.

136. Yet another point for consideration in connection with the enactment of an Irrigation Law is the extent to which irrigation should be allowed free of charge or at concessional rates. The Irrigation Bill of 1924 provided that no cess for water should be levied (1) on Government land registered as wet unless such land having been registered as single-crop wet land was cultivated with two or more irrigated crops and (2) upon "mamul" wet land in an estate except for water supplied or used for more than the number of crops recognized by the Government as entitled to water free of cess. The Bill also provided for the determination and localization of the extent of mamul wet land in an estate and for the levy of enhanced assessment upon Government land classified as wet and a charge for water upon mamul wet land in an estate, whenever the supply of water was enlarged or otherwise improved by the Government. The Government spend large sums of money on irrigation works and to make the scheme remunerative a special water-cess may have to be levied and ryots will have to pay the rate fixed whether they will take water or not. In the case of the Bhavani Reservoir project the Government have passed the Bhavani Reservoir Irrigation Cess Act to enable them to realise water-cess whether the lands are actually irrigated from the water from the reservoir or not. A similar legislation has been recommended for the Tungabhadra project also. The development of irrigation under Government sources in the Province has reached a stage at which the law of diminishing returns has begun to operate. In future it will be very difficult to undertake a project unless it is certain that—

(*a*) once a scheme is prepared the private owners of existing sources in the scheme tract will be under an obligation to co-operate with it; and

(*b*) the private owners of land will be obliged to pay the prescribed water-cess on the lands settled as benefited by the scheme.

137. Another point on which legislation is necessary, is about the determination of compensation to be awarded when existing irrigation rights are interfered with. At present it is unlawful to deprive a land of water in order to divert it to some other purpose. Public interest may require such diversion. Just as the Government have power under the Land Acquisition Act to acquire land on payment of compensation they should take power to divert water either temporarily or permanently for a public purpose, and assess and pay compensation therefor. The rivers and streams in the Malabar district present a peculiar problem. According to the ruling of the High Court in what is known as the Olappamanna judgment the ownership of rivers and streams that are non-tidal and non-navigable in the Malabar district is vested in the owners of the land on either side of the river or stream. The need for legislation in respect of irrigation from these rivers and streams and the form which such legislation may take will depend to some extent on the Land Tenure Reforms to be introduced in the district.

At present contribution in respect of irrigation works is being recovered under section 142 of the Estates Land Act and under section 70 of the Indian Contract Act. The former section applies to irrigation works which are situated in estates and which the landowners are bound to keep in a state of repair. The contributions due from the landowners is recoverable as an arrear of land revenue. Section 70 of the Indian Contract Act applies to irrigation works situated outside the estates. Contribution leviable under this section is not recoverable as arrears of land revenue but by filing a civil suit. It is necessary to make the law uniform in this respect.

It is found that the enforcement of kudimaramath under the existing procedure is cumbrous and unpopular. The Madras Irrigation (Voluntary) Cess Act, 1942, provides for the levy of a voluntary cess for the maintenance of irrigation and drainage works serving ryotwari tracts in the Province in lieu of kudimaramath. This Act has to be incorporated in any future legislation. This Act however provides for the levy of a cess in lieu of kudimaramath only when the holders of two-thirds of the land served by the irrigation works so desire. Power should be taken by the Government to levy a cess whenever they find it expedient to do so; for a two-thirds majority may not be obtainable in all desirable cases though the Government are satisfied that kudimaramath would not work owing to want of co-operation among the ryots. The scope of this Act should also be enlarged to include zamindari tracts. The Madras Irrigation Cess Act, 1865, has been amended by Act VI of 1940, providing for levy of enhanced penal water rates for unauthorized irrigation of lands, even if the irrigation

is involuntary and for raising a second crop on single crop wet land. The amended Act has to be embodied in the proposed Irrigation Law.

General conclusions

138. Irrigation policy has, in the past, been guided by the principle of productivity subject to a relaxation of this principle in areas liable to famine. In other words, the areas benefited by the introduction of an irrigation scheme should produce sufficient extra income with the help of the project to pay for the interest on the capital expended on it. This has led to two defects. Firstly on the administrative side, there has been a tendency all along to show exaggerated figures of income in the original estimate for a project. The following statement in respect of the projects executed in the recent past in this Province clearly illustrates the difference between the original estimate and the actuals realized :—

Name of project.	Year it started working.	Estimated total extent.	Capital outlay in lakhs.	Return on capital expected.
(1)	(2)	(3)	(4)	(5)
		ACS.	RS.	PER CENT.
1. Polavaram Island Project ..	1934	17,500	18·24	8
2. Bhavanasi tank	1919	719	2·65	3
3. Mopad Reservoir	1921	12,500	22·19	3·36
4. Tippayapalayam Reservoir ..	1924	1,500	4·68	3·2
5. Yellanur tank	1919	1,707	2·70	..
6. Willingdon Reservoir (Toludur Project).	1925	26,851	32·10	6·24
7. Cauvery-Mettur Project ..	1932	301,000	737·08	8
8. Siddhapur tank .. .	1919	4,250	8·62	2·85
9. Venkatapuram tank .. .	1919	1,705	3·85	2·6

Name of project.	Water rate proposed.	Actual extent irrigated.	Present water rate.	Return on capital realized.
	(6)	(7)	(8)	(9)
	RS. A. P.	ACS.	RS. A. P.	PER CENT.
1. Polavaram Island Project ..	10 8 0	13,152	5 12 0	4·52
2. Bhavanasi tank	9 6 0	556	9 6 0	0·39
3. Mopad Reservoir	7 13 0	3,969	7 13 0	0·81
4. Tippayapalayam Reservoir ..	12 0 0	721	5 0 0 (for dry crops)	0·30
5. Yellanur tank	4 0 0	512	4 0 0	0·23
6. Willingdon Reservoir (Toludur Project).	6 4 0	16,109	6 4 0	2·56
7. Cauvery-Mettur Project ..	15 0 0	152,166	5 0 0	1·25
8. Siddhapur tank	6 0 0	721	6 0 0	0·16
9. Venkatapuram tank	9 6 0	269	4 3 0	0·16

139. It is significant that this difference exists in practically every case. It cannot be said that this is due completely to the difficulties of framing a proper estimate. It would be more reasonable to infer that it is the result of a legitimate fear that if the true position is carefully estimated in the beginning, a project would never be sanctioned. Consequently the original estimates are attempts to bloat up income figures in order to pay homage to a

principle which, if meticulously followed, would result in practically no useful irrigation work being sanctioned. The other defect is the application of the principle of remunerativeness to works of improvement and drainage. In many cases, these works cannot show a direct increase of revenue, but nevertheless failure to take measures at the proper time will lead to rapid deterioration. In respect of drainage, especially, the adverse effects are cumulative and widespread. An ill-drained area may produce half the normal outturn of a well-drained area. In such a case it will be impossible to show any increase of revenue to Government by removing the defect, but the benefit to the people will be immense. What is necessary, therefore, is a more practical and realistic approach to investment on irrigation schemes. The old criterion of productivity does not accord with modern socialistic views of the duty of the State towards the people. The criterion for an irrigation work should rather be the increase in the yield of the crops, the protection from liability to crop failure and the general increase in prosperity and the consequent well-being arising therefrom rather than the increase of income to the State by way of land revenue or water charge. It has already been shown above how the present rules encourage indirect transgressions. There is no reason why Government should acquiesce in this false position. The benefits afforded by irrigation will directly be confined to a particular area, but indirectly they will be spread over a much larger region, and this should be realized. In respect of improvements and drainage works, the urgency of the work alone should be the criterion. It is needless to add that in regard to minor irrigation works which have no separate capital and revenue accounts, the introduction of the criterion of productivity is its *reductio ad absurdum*. In the last few years, there has been a welcome tendency to make departures from this principle where necessary. In areas heavily liable to famine, even protective rates are not now being insisted on. The need for growing more food during the war years has resulted in the sanction of several schemes which would not have been sanctioned in earlier years. More recently, the Government of Madras have accepted that indirect returns from an irrigation project may also be taken into account in calculating the yield from a project. These, however, are halfway measures. In a country where so much of agriculture is dependent on the monsoon and where the monsoon is notoriously capricious, what is necessary, is a reorientation of irrigation policy itself; the benefit to the people and not income to the Government being the test for sanctioning an irrigation work. This would mean a radical alteration in the point of view of those who control the finance of the State. But if irrigation is recognized as a public utility, then it need no longer be made self-financing. The general tax-payer can incur interest charges on irrigation rather than charges for famine relief, anti-epidemic measures, hospital facilities and other ameliorative steps that follow in the wake of insufficient food and poor health.

Famines and Famine Relief

Causes of famine

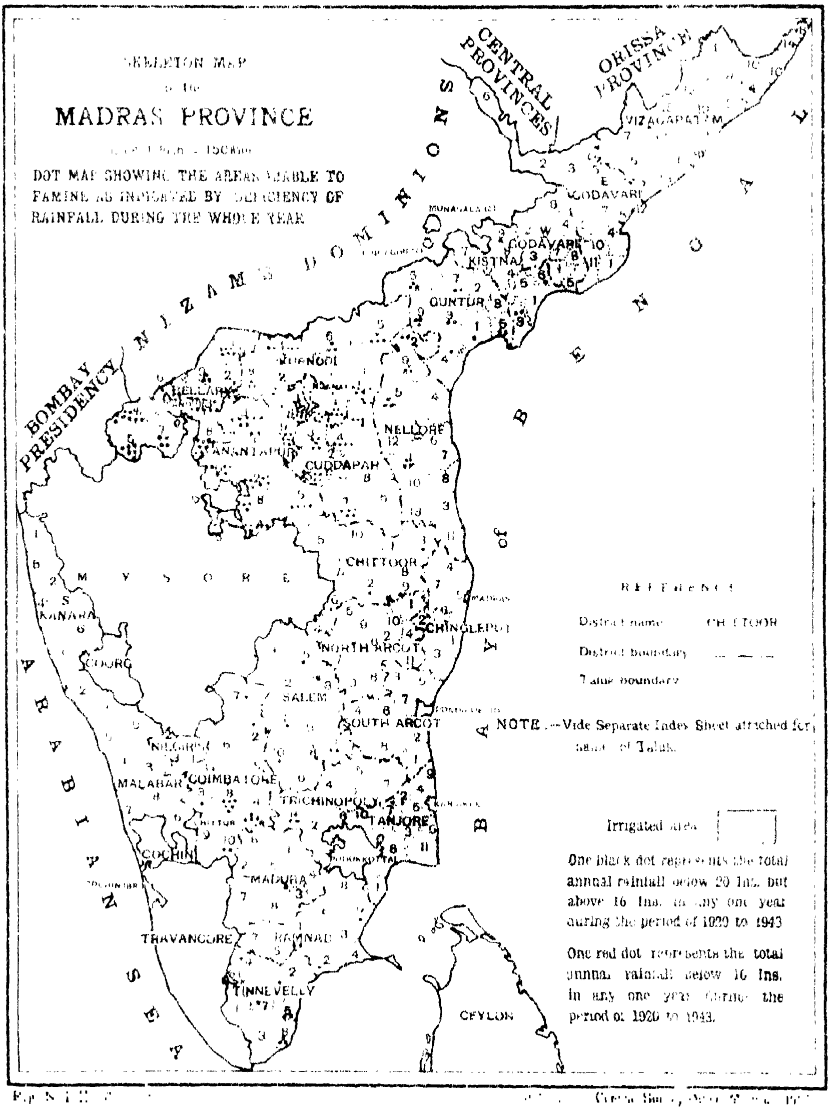
140. The proximate cause of a famine in times of peace is the failure of crops resulting from insufficient or untimely rainfall. Such failure over a restricted area in a single season, after a year of normal plenty will not of necessity produce famine or even such a degree of scarcity as to call for State intervention. The food outturn of an ordinary year is usually more than sufficient to meet the wants of those dependent on it for their subsistence until the next harvest. On the other hand, when the crops are lost over a large extent of the country for two or more seasons in succession, the probable result will be severe distress among the smaller landholders and the landless classes, such as field and other labourers and petty artisans. Should the drought continue, the distress becomes more widespread; the stores of grain reserved by the larger landholders for domestic consumption are gradually exhausted; the grain dealers keep their stocks back from the market; prices rise rapidly; private charity becomes contracted; and the pinch of famine is seriously felt by all but the wealthy.

Tracts secure from famine

141. South Kanara and Malabar on the West Coast, and Godavari, Kistna and Tanjore on the East Coast may be considered to be practically immune from famine, though in Malabar the pressure of population and the consequent inadequacy of local food supplies have created among the poor people, particularly in seasons of bad harvest, conditions bordering on famine. From their favourable geographical situation Malabar and South Kanara enjoy an almost phenominal rainfall, whilst the other three delta districts are protected by magnificent irrigation works, which afford an assured water-supply to large areas of rice lands. Besides the five districts mentioned above, the districts of Vizagapatam, Tinnevelly, South Arcot, Trichinopoly and Nellore can also be said to be generally secure though in a smaller degree. There have been periods of scarcity in these districts also in the early periods before the development of irrigation works, but after the execution of the several irrigation projects, anything like severe famine has been unknown. On the whole therefore these ten districts which account for more than 40 per cent of the total area and 50 per cent of the total population of the Province may be fairly regarded as secure from famine.

Tracts liable to famine

142. The remaining districts (excluding Madras) of the Presidency are more or less liable to famine, with the exception of small areas protected by works of irrigation. The most insecure districts are those known as the Deccan districts, comprising Kurnool, Bellary, Anantapur and Cuddapah, which have frequently suffered from famine during the last one hundred years. They cover a total


MADRAS PROVINCE
RAINFALL DURING THE WHOLE YEAR
CENTRAL PROVINCES
ORISSA PROVINCE
NIZAMS DOMINIONS
BOMBAY PRESIDENCY
MYSORE
ARABIAN SEA
BAY OF BENGAL
VIZAGAPATAM
GODAVARI
KISTNA
GUNTUR
KURNOOL
BELLARY
ANANTAPUR
CUDDAPAH
NELLORE
CHITTOOR
CHINGLEPUT
NORTH ARCOT
SALEM
SOUTH ARCOT
COORG
NILGIRIS
MALABAR
COIMBATORE
TRICHINOPOLY
TANJORE
COCHIN
MADURA
TRAVANCORE
RAMNAD
TINNEVELLY
CEYLON
NOTE.—Vide Separate Index Sheet attached for
Irrigated area
One black dot represents the total annual rainfall below 20 Ins. but above 16 Ins. in any one year during the period of 1920 to 1943
One red dot represents the total annual rainfall below 16 Ins. in any one year during the period of 1920 to 1943.

area of 27,500 square miles with a population of 4½ millions, the majority of whom depend upon agriculture for their livelihood. The average annual rainfall in that region is only 25 inches and this precarious rainfall makes crop production very difficult. These districts are drained by the Kistna and the Pennar rivers and their tributaries, but with the exception of the Kurnool-Cuddapah canal, the Cumbum tank in Kurnool and the Tunga-bhadra channels in Bellary, there are no important irrigation works, and crops are almost entirely dependent on the very precarious and scanty rainfall. The districts of North Arcot and Salem have also suffered periodically from famine, the most disastrous of which was in 1876 to 1878. Later in 1891–92 and 1896–97, considerable portions of these two districts suffered from severe distress. In North Arcot and Salem well irrigation has largely developed and affords a considerable measure of protection. The Palar, Poiny and Cheyyar systems also help to ease the situation considerably. The other districts affected are Coimbatore, Madura and Chingleput. The Chingleput district has suffered from famine five times during the last century and from crop failure on other occasions, but owing to its proximity to the presidency town, it has not felt the effect of the famine to the same extent as the other affected districts. More than 50 per cent of the cultivated area in this district is irrigated, but the nature of the irrigation works is such that hardly a tenth of the area is protected in a year of severe drought. In Coimbatore the rainfall is generally scanty and precarious, but the district possesses great natural advantages in the way of sub-soil springs, which have been utilized to the fullest extent by an industrious and thrifty population. However, famines are still common in certain taluks. In Madura, the Periyar Project has greatly improved the position; but over a large area consisting of Zamindari estates the irrigation works are not in a satisfactory condition and famines still occur. The following statement shows the famines in this Province from 1790 onwards and the tracts affected by each famine :—

Years.		Tracts affected.
1790	..	Northern Circars.
1799	..	Madura district.
1804	..	Tanjore and South Arcot.
1805–07	..	Ceded districts, Carnatic, North Arcot, Trichinopoly and Tanjore.
1812–14	..	Madura district.
1824	..	Carnatic, Central and Ceded districts and part of the Circars.
1833	..	Northern districts and Madras. Extended also to Chingleput, South Arcot, North Arcot, Old Bellary and parts of East Godavari.
1854	..	Bellary.
1866–67	..	All parts of the Province, except the districts of East Godavari, West Godavari, Kistna, Guntur, Tinnevelly and South Kanara.

Years.	Tracts affected.
1876–78	Ceded districts, Nellore, North Arcot, parts of Kistna, Central and Carnatic districts.
1890–92	Carnatic, Central and Southern districts.
1896–97	Ceded districts, Vizagapatam and parts of East Godavari districts.
1900	Ceded districts and portions of Nellore and Kistna.
1901	Cuddapah, Anantapur, Chingleput and North Arcot.
1905	Part of Chingleput district.
1919	Part of Nandigama taluk of the Kistna district.
1921–22	Portions of Bellary, Anantapur and Kurnool districts.
1924	Portions of Bellary and Anantapur districts.
1926	Dharapuram taluk of Coimbatore district.
1931–32	Portions of Bellary district.
1934–35	Portions of Bellary and Anantapur districts.
1937–38	Bellary, Anantapur and Kurnool.
1939	Parts of Coimbatore district and five taluks of Chingleput district.
1942–43	Parts of Bellary, Anantapur and Kurnool.

The following statement shows the areas and the population according to the 1941 census which are liable to famine periodically :—

Anantapur District.

Anantapur	136,446	Dharmavaram	99,260
Gooty	178,189	Hindupur	127,805
Madakasira	107,166	Tadpatri	127,700
Penukonda	104,094	Kalyandrug	97,321

Bellary District.

Adoni	201,200	Bellary	151,403
Alur	111,445	Rayadrug	106,854
Siruguppa	69,431		

Kurnool District.

Kurnool	177,273	Pattikonda	128,879

Coimbatore District.

Palladam	324,039	Dharapuram	321,794
Udamalpet	181,047		

Experience has shown that though there are in this Province many tracts which are subject to frequent failures of monsoon and which are not fully protected by irrigation works, abnormal seasonal scarcity on a scale sufficient to require special measures to deal with it exists only in the Ceded Districts. Here too the famine areas are mostly confined to the eastern part of the Bellary district, the western part of Kurnool and the greater part of Anantapur. The entire ayacut of the Kurnool-Cuddapah canal is outside the famine zone due to the irrigation facilities existing in that area. The other important famine tract is the middle part of the Coimbatore district, Kollegal and the Southern part of Salem.

Relief measures

143. It has been recognized as the duty of the State to take steps to avert the loss of human life by famine. It is therefore found necessary for the Government to have a programme of action, so that when famine is imminent, prompt and effective measures of relief may be taken. Experience has shown that a scheme of relief organization carefully devised beforehand involves less outlay and secures more satisfactory results than action taken when the State is brought face to face with a calamity.. The main object of State intervention in a famine campaign is to save life and all other considerations are subordinated to this. The success or otherwise of relief methods at such a crisis cannot be subjected to a financial test. It is not intended to suggest that it is the duty of the Government to maintain the population at the normal level of comfort or to insure them against all suffering. The responsibilities of the State may be said to be limited to the extent of protecting the people from starvation in time of distress.

The Famine Code

144. With a view to having a planned scheme for combating famines in this Province a Famine Code has been compiled. The Code gives elaborate instructions in respect of standing preparations, intelligence for the reporting of signs of famine and preliminary measures of enquiry and preparation when rains fail. It also provides for the procedure to be followed in organizing famine relief. Famine relief is afforded under two main systems, namely, by organizing relief works to individuals who are able to work and by extension of gratuitous relief to individuals who are physically or otherwise unable to do work. The following other measures are also adopted for affording direct or indirect relief :—

(1) Assistance to aboriginal tribes.

(2) Assistance to weavers and other artizans.

(3) Advances under the Land Improvement Loans Act and the Agriculturists Loans Act.

(4) Suspension and remission of Land Revenue.

(5) Preservation of cattle.

(6) Protection of orphans.

The statement in Appendix 10 shows the details of famine relief given by the Government during the last forty years.

Prevention of famine

145. The Famine Code Revision Committee constituted in 1938 considered the remedial measures to be undertaken in the areas after consulting a number of official and unofficial witnesses. Their conclusion was, to quote their own words :—

"[1] State intervention has up to the present been largely confined to measures designed to save life and mitigate suffering;

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[1] Report of the Madras Famine Code Revision Committee, 1938. Volume I—Report, page 4.

in our opinion a bolder policy is now called for which we trust will not only be of incalculable benefit to the people by creating much needed wealth and fostering power of resistance, but will in the long run save the resources of the State from the steady drain caused by the recurring needs and continued poverty of these districts." The Committee among other things recommended the following multi-directional programme :—

(1) Development of irrigation, i.e., the provision of irrigation facilities, and tank restoration,

(2) introduction of improved methods of agriculture such as bunding, and dry farming,

(3) exploitation of the mineral resources and development of large scale industries, and

(4) development of cottage industries.

The committee also recommended the constitution of a Board called the Ceded Districts Economic Development Board consisting of both officials and non-officials for the economic development of the Ceded Districts in the several directions mentioned above. The Government constituted the Board in 1941. The Board draws up schemes of development and sees that approved schemes are executed by the departments concerned as promptly as possible. It also co-ordinates the work of the several departments. Reference has already been made to the Tungabhadra and the Godavari schemes and to their anticipated effect in banishing famine from Southern India in general and from the areas served by the schemes in particular. The proposed lower Bhavani Project in the Coimbatore district is expected to irrigate over two lakhs of acres and to prevent the recurrence of any famine in that tract in future.

146. The Ceded Districts which have the highest liability to famine are being specially looked after at the present time. The future of these districts lies first in protected irrigation and second in the development of industries, especially industries based on minerals. Special steps should be taken to develop these areas in as many different ways as possible. The Tennessee Valley Authority has shown the way to what is now popularly called ' Multi Purpose Development." This development should be in the hands of a body solely engaged in this purpose and transcending normal administrative boundaries. A public corporation is the most suitable form for such an organization. It would operate in close co-operation with Government officers and it would promote the development of backward areas all along the line. What is necessary in this Province is the application of the Tennessee Valley principle to backward regions; the Ceded Districts and the Agency tracts may be given as examples.

CHAPTER V—TECHNOLOGICAL AND OTHER IMPROVEMENTS IN AGRICULTURE

Development of technology and the evolution of the Agricultural Department

Early History

147. The application of science to crop production is a recent development in the history of agriculture which had for long depended on empirical methods. In England the Rothamstead Research Station was established in 1843 and its centenary was recently celebrated. In this "century of progress" in agricultural science, cultivation practices have been greatly rationalized, resulting in increased and better crop production.

[1] In India very little interest was evinced by the Central or Provincial Governments in the development of agriculture till the 1880 famine. Stray attempts had, however, been made in this direction in some Provinces over a long period of years and by a variety of methods. The Famine Commission of 1880 attempted to find out some practical measures by which famines could be avoided or at least their severity minimized. [2] The Commission also investigated the question of practical improvements in agriculture and the State intervention necessary to "encourage this branch of national industry" The Commission among other things recommended the revival of the Department of Agriculture by the Government of India and the simultaneous formation of Agricultural departments in all Provinces. This did not materialize immediately until Dr. Voelkar came to India in 1889 to advise upon the best course to be adopted to apply the teachings of agricultural chemists to Indian Agriculturists, and to effect improvements in Indian agriculture. This was the first definite attempt to frame a policy of Agricultural Research suited to Indian conditions.

148. [3] In Madras practical interest in agricultural development was awakened as early as in 1863 by Sir William Denison, the then Governor, who drew attention to the practice of continuous cropping, the deficiency of manure and its consumption as fuel, the defective implements, the lack of trees, the poor cattle and the want of accurate knowledge and statistics in this Province. An order was placed in England for a steam plough, some steam harrows and cultivators, seed drills, threshing machines and winnowers, chaff cutters and water lifts. The Government also entrusted, in 1864, 350 acres of land at Saidapet near Madras to a committee of

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[1] Royal Commission on Agriculture in India (Abridged Report), 1928, page 16.
[2] *Ibid.*
[3] *Ibid.*, page 22.

amateur agricultural enthusiasts, who undertook to conduct on it (1) a full trial and exhibition of the agricultural implements received from England, (2) a full trial of artificial manures, and (3) an exhibition to the people of improved system of agriculture. The Committee laboured for seven years without much success as no preliminary investigations of local conditions had been made, and in 1871, the farm passed under official control.

149. After the failure of this scheme, an attempt was made to work out a scheme of agricultural education. [1]" A complete and high class public Agricultural College " was established at Saidapet in 1876. In 1884 the control of the College was transferred from the Board of Revenue to the Director of Public Instruction with whom it remained until the reorganization of the Agricultural Department in 1905. In 1885, except for a small portion which remained attached to the College, the farm at Saidapet was abolished. The Superintendent of the farm was made an assistant to the Commissioner of Agriculture for general statistical and agricultural work. From 1887, to 1905, the main energies of the department were devoted to the business of famine analysis, to the tabulation of village statistics and to enquiries on various agricultural or economic subjects in different parts of the Presidency. Much of the Saidapet land was kept on as a dairy farm; but with a fundamental change of policy, district farms were opened for the investigation and study of specific problems.

Thus the history of Government efforts to improve agriculture in Madras from 1863 to the close of the century falls into three periods. The first witnessed the ascendency of the idea of a model farm worked on western methods, the second was dominated by a barren discussion on agricultural education, and in the third agricultural effort was blighted by the insistence on the importance of statistics. However, the work done by Mr. W. R. Robertson during his long tenure of office as Principal of the College and Superintendent of the Experimental Station at Saidapet and later by Mr. C. A. Benson as Deputy Director of Agriculture left its mark on the development of the Agricultural Department after its re-organization in 1905. The old students of the Saidapet college played no inconsiderable part in the development of the department in its later stages.

150. Towards the close of the last century several natural forces led to the investigation of various problems connected with crop production. Several of the staple crops of Madras were affected by diseases. Between 1895 and 1897 the sugarcane area in the Godavari district steadily declined owing to the ravages of 'red rot'. An Economic Botanist was therefore appointed to investigate this disease. In 1901 he was allowed to lease land in Godavari to try and find resistant varieties; and a farm was opened in the district in 1902. The groundnut area began to shrink in 1903 and 1904 due to insect attack. New varieties of groundnut were

[1] Royal Commission on Agriculture in India (Abridged Report), 1928, page 23.

introduced in place of the old varieties. Diseases of pepper on the West Coast attracted attention. A farm was opened in Malabar for the investigation of "pollu" disease in pepper. Cotton which is an important export produce crop simultaneously received attention and two stations were opened in 1901 in Bellary and Tinnevelly to improve this crop. Thus was laid the foundation for further crop investigation in the new era of agricultural advance which commenced in 1905.

Though the achievements of the department prior to 1905 were negligible, sufficient ground had been cleared for the definite advancement of agriculture and in the application of science to better crop production. The work of Dr. Barbar, who was brought from the West Indies to tackle sugarcane diseases, formed the basis for the improvement of indigenous varieties of crops by selection. It was found that selection and breeding offered much greater possibilities for crop improvement than the introduction of exotic varieties which were influenced by environment. A few outstanding successes in the introduction of exotics were, however, recorded in groundnuts and potatoes. As the technique of improved agriculture was itself in its infancy during the early decades of this century, agricultural extension work did not make much headway and the attempts to spread better cultivation methods among ryots did not produce tangible results.

151. A landmark in agricultural development was the establishment of the Pusa Agricultural Research Institute in 1905 and the establishment of the Agricultural College and Research Institute of the Province at Coimbatore in 1907 in pursuance of the policy for agricultural development laid down by Lord Curzon. Since then, agricultural research and extension have progressed side by side and the staff for the work have been found from among the graduates trained in the College. The Government of India Act of 1919 placed agriculture in the Province under a popular Minister as a transferred subject. In 1921, the Central Cotton Committee was constituted by the Government of India to stimulate and assist the production, marketing and utilization of Indian cotton. The Committee financed Provincial Governments in research work on problems connected with the improvement of Indian Cotton and Madras availed itself of the opportunities and facilities afforded by this body.

In 1928, the Royal Commission on Agriculture made its report, the most comprehensive account of Indian agriculture yet published, and this opened a new chapter in agricultural development. The report recognized that the problem of improving Indian agriculture was really the problem of improving Indian village life and that they were inseparable and contiguous. As a result of the Commission's recommendations, the Imperial Council of Agricultural Research was set up to give the lead in the application of science to the problems of Indian agriculture and to co-ordinate

agricultural research. Under the council's auspices several schemes of research have been undertaken in this Province and have been either completed or are under way. They cover a wide field of subjects and include research programmes on fruits, potatoes, rice, sugarcane, oil seeds, dry farming, animal nutrition, marketing and cost of production of crops.

In the field of agricultural education, the College at Coimbatore was affiliated in 1920 to the Madras University, and a separate faculty in agriculture was created and the B.Sc. degree course in Agriculture instituted. The first batch of graduates came out in 1923. With a view to meeting the increasing demand for agricultural graduates another college has been now opened at Bapatla in the Guntur district, for the Telugu areas.

The Economic Depression

152. A serious obstacle to the unfettered development of agriculture in the Province was the general economic depression of the thirties which affected practically all activities throughout the world. There was a heavy fall in agricultural prices commencing from 1929.

Being an agricultural Province the strain due to the fall in prices was comparatively greater in Madras. The money income of the ryot was halved by 1933-34 as compared to that of 1929-30. The fall in agricultural costs was not proportionate to the general fall in prices, as several items of costs such as land revenue and interest charges were inelastic and could not be brought down. Suspensions and remissions of land revenue were granted on a large scale but they were inadequate to meet the needs of the situation. The depression considerably lowered the ryot's standard of living and increased his debts.

Agriculture under Provincial Autonomy

153. The popular Ministry which came into power in 1937 was enthusiastic about agricultural improvement and rural reconstruction. Several legislative measures were either planned or undertaken to reduce the agriculturist's burden of debt and to bring about reforms in tenancy. The Ministry was, however, short-lived and went out of office with the declaration of World War II.

A modern war needs the total mobilization of agricultural and industrial production in a country and when the recent war started, the country was unprepared for any such colossal effort. Several control measures were instituted. War purchases on behalf of allied governments resulted in rise in prices. Agriculturists, however, were benefited only partially, as the cost of production also went up with the prices. Lack of imports of essential food grains resulted in a shortage of food supplies and the " Grow More Food Campaign " was inaugurated with the object of making the Province

self-sufficient in food. There is a lively realization now that the mobilization of resources effected for war should be canalised for peace.

Soil study and its importance

154. A description of the soils of the Province and their characteristics has already been given in the introductory chapter. It will be seen from it, that the soils vary in agricultural quality from region to region. A soil survey would be desirable with a view to classifying and mapping these soils by modern methods. The Royal Commission on Agriculture accepted the need for a detailed soil survey but did not recommend its being taken up then. [1] They were of the view that " soil surveys should only be undertaken when there is a specific problem to solve or when laboratory examination of soils is required to interpret information already on record ". They also suggested that the Imperial Council of Agricultural Research should undertake the collation and publication of all the available information regarding the composition and characteristics of Indian soils. Their main reason for deferring the soil surveys was one of cost. [2] They stated that " the cost of a complete soil survey would be prohibitive ".

As a result there has been so far no systematic soil survey of India in spite of the recommendations of the Irrigation Commission of 1901, that such a survey is an essential preliminary to the development of irrigation schemes. The soil problems in regions of canal irrigation are numerous and complicated. It is well-known that the delta areas in this Province do not yield as much as some of the other rice growing areas. The reason is mainly the defective surface and subsurface drainage. Maximum crop production is the resultant of a balance between physico chemical and biological processes. Here the physical and chemical properties of the soil play a dominant part in relation to soil moisture, incidentally controlling the biological activities.

Isolated soil surveys of the various tracts in this Province have, however, been undertaken for different purposes. A beginning was made in the year 1914 in the survey of the Tanjore delta mainly with a view to appraising the quantities of the major plant food elements present in the soil and to determining the manurial requirements of the areas. As rice forms the staple article of diet of the people in this Province, soil surveys undertaken in the years between 1914 and 1928 were confined to deltaic tracts where rice is the principal crop raised. They included Tanjore, Guntur, Godavari, Kistna and Periyar areas. In the year 1921, a survey of the Malabar district was undertaken because rice is grown there on an extensive scale, though no irrigation facilities are available as in the tracts surveyed previously.

[1] Royal Commission on Agriculture in India, 1928, page 122.

[2] *Ibid.*, page 74.

155. Experience has shown that, when an irrigation project has been undertaken without a previous survey of the probable effect of the application of irrigation water on lands accustomed to receive only rain water, the result has in some cases been unfavourable to the lands sought to be benefited, raising more problems for solution than the original one sought to be solved. For instance, irrigation in the Cauvery Mettur Project lands in Tanjore has completely destroyed all the jack trees in that area. The large proportion of sand in the soils has also rendered the theoretical calculations of the duty of water for the crop and the consequent area over which the available water could be used unworkable in practice. A preliminary soil survey would thus seem to be the first rational step to be taken before launching irrigation schemes. A survey has now been made of the area proposed to be irrigated under the lower Bhavani Project. A similar survey has been completed of the area under the Tungabhadra Project and the indications are that the note of pessimism sounded in certain quarters against these schemes has been unduly gloomy and that there need be no fear of deleterious effects with a judicious use of the water. The need for a scientific study of soils in relation to crop production cannot be overemphasized.

The manure problem

156. The application of manures to cultivated lands to increase their productivity was practised many centuries before a scientific explanation of the function of such substances was sought or attempted. The use of farmyard manure is as old as agriculture and ancient treatises record the usefulness of wood ash, bones and refuse materials for increasing soil fertility and better crop production. These manures and the recently introduced " chemical " or " commercial " fertilisers increase the fertility of the soil by replacing plant foods removed from the soil by the crop and by improving the physical texture of the soil. Plants require many elements for their growth, but the most important are Nitrogen, Phosphorous and Potash. Of these, the most essential is Nitrogen from the point of view of plant growth under South Indian conditions. It may generally be stated that Nitrogen functions in the vegetative growth of the plant and Phosphorous more in the reproductive aspect, viz., grain production. With regard to potash, the third essential plant food, South Indian soils do not seem to need this constituent except in the case of a few crops like potato, tobacco and some fruit crops. The absence or deficiency of any of these elements must be regarded as a limiting factor in crop production. When all the elements are present in the soil, maximum yields are obtained, provided the other outside factors of production, like water, are satisfied.

With every crop removed from the land, the soil is depleted of the three important plant nutrients—Nitrogen, Phosphoric acid and Potash—and the quantity removed varies with the kind of crop.

The approximate quantities of nutrients removed by some of the principal crops of the Province are given in the following table :—

Name of the crop.	Nitrogen.	Phosphoric acid.	Potash
	In pounds per acre.		
(1)	(2)	(3)	(4)
Paddy	48	23	41
Sugarcane	56	68	190
Cotton	97	29	83
Tobacco	67	9	85
Cholam	72	25	45
Ragi	49	30	202
Cumbu	28	10	11
Varagu	23	10	17
Maize	25	10	25

On the basis of the area sown with the above crops in 1944-45, the quantities of plant nutrients to be replaced annually are estimated as follows :—

	IN TONS.
Nitrogen	548,350
Phosphoric acid	230,193
Potash	553,054

If the total area sown with both food and non-food crops in 1944-45, viz., 36,999,372 acres, is taken into account, the annual requirements of nutrients to replace these removed from the soil work out as shown below :—

	IN TONS.
Nitrogen	887,000
Phosphoric acid	372,000
Potash	894,000

Manure resources of the Province

157. The different kinds of manures available and used in the Province may be classified under the following three heads :—

(A) Bulky organic manures.
(B) Concentrated organic manures.
(C) Artificial or chemical manures.

Bulky organic manures

158. In this group, the largest source of supply is cattle or farmyard manure. Shortage or non-availability of fuel in many places leads to the use of cattle dung as fuel. Litter is rarely provided for the cattle by a large mass of the ryots. Manure conservation methods are crude, resulting in loss of manure and plant nutrients from the bulk. [1] Dr. Burns has given the daily manure production for cattle at 40 lb., for buffaloes at 50 lb., and young stock at 20 lb. On this basis, cattle population of the Province according to the census of 1944 will produce 135,987,000 tons of cattle manure. Allowing for a wastage of two-thirds, the

[1] Dr. Burns' Technological Possibilities of Agricultural Development in India, page 116.

available quantity for manuring purposes may be estimated at 45,329,000 tons. The percentage composition of an average sample of cattle manure on an air dry basis has been found to be as follows :—

	PER CENT.
Nitrogen	1·22
Potash	1·20
Phosphoric acid	0·62

Taking 40 per cent as the dry basis, the total nutrients from farmyard manure in the Province is 221,205 tons Nitrogen, 112,416 tons Phosphoric acid and 217,479 tons Potash. Another important source is sheep manure. Sheep rearing is common in many districts of the Province and on an estimated annual production of 2½ cwt. per head, after allowing for all wastages, the total production of sheep manure from the sheep population will be 1,300,000 tons.

Compost manure

159. Waste organic matter like municipal rubbish, weeds, cotton stalks and other farm refuse can be made into good "compost manure" by a proper system of biological fermentation. Next to farmyard manure, composts if properly made will constitute an important source of manure for cultivation.

The urban population of the Madras Province was 7,864,883, according to the 1941 census and that of the municipalities, 4,382,790. On the assumption that the output of rubbish for a family of five members is three pounds per day, the annual output would be half a ton per family. The total amount of rubbish from the entire urban population would then be 800,000 tons per year and from the municipal population about 400,000 tons per year. Nightsoil, another municipal waste, is also an important source of manure if properly conserved and utilized. On the assumption that for a unit of 1,000 population twelve gallons of nightsoil are actually collected in a municipality, the total available quantity of nightsoil in the municipalities comes to 44,000 gallons or about 200 tons a day (1 ton equals 220 gallons) or 73,000 tons a year.

Green manures

Green manures are noted for their beneficial action on paddy lands. Their efficiency compared to others, worked out from the recorded field experiments will be apparent from the following :—

Manure.	Efficiency compared to that of green manure = 100
No manure	33·0
Phosphate only	50·0
Nitrogen only	70·0
Nitrogen + Phosphate	90·0
Green manure	100·0
Green manure + Phosphate	120·0
Green manure + Nitrogen	133·0
Green manure + Nitrogen + Phosphate	166·0

The precise conditions for successful green manuring have been worked out and the chemical researches on green manure by W. H. Harrison and P. A. Subrahmanya Ayyar at Coimbatore between the years 1911 and 1917 have shown that the value of green manure for paddy lies more in its physical effects than in its nitrogen. The more recent researches elsewhere partly confirm and partly contradict the results of the Coimbatore work. Pending further researches it may be assumed that green manures are useful both on account of their nitrogen contents and their physical effects. The more important green manure crops grown are Daincha, Wild Indigo, Sunnhemp and Phillipesara. The last two are also raised for fodder purposes. The area under green manure crops in 1943-44 was over 900,000 acres and on an average yield of 3 tons per acre, the total production of green manure is estimated at 2,700,000 tons.

Concentrated organic manures

160. Concentrated organic manures may be classed as nitrogenous or phosphatic depending upon their rich content of nitrogen or phosphoric acid. Some of them are rich in both. Their application is usually to commercial or money crops like sugarcane or plantain, but their use is now being extended to the paddy crop as well.

Oil cakes

Oil cakes like groundnut and others belong to the nitrogenous class of concentrated organic manures as they are rich in nitrogen. Some of the common cakes used for manure purposes and their chemical composition are given below :—

Oil cake.	Nitrogen.	Phosphoric acid (percentage).	Potash
(1)	(2)	(3)	(4)
Groundnut	8·0	1·4	1·2
Castor	4·5	1·9	0·7
Neem	5·0	1·3	1·7
Pungam	3·6	1·3	0·7

Of these, the most important is groundnut cake. It is extensively used in all districts for manuring purposes. The annual production in the Province is estimated at 246,000 tons.

Castor cake is also used for irrigated crops. The main districts of production are Guntur, North Arcot, South Arcot, Salem and Cuddapah. The normal production of castor cake is estimated at 10 to 12 thousand tons. Small quantities of other cakes like Pungam and Neem are also used for manuring purposes in some districts of production—Pungam mostly in the Chittoor and North Arcot districts. Their average annual production is estimated at 1,850 tons.

The total production of oil cakes available for manuring purposes is thus 260,000 tons.

	IN TONS.
Groundnut cake	246,000
Castor	12,000
Neem	1,200
Pungam	650
	259,850 or 260,000

Among the phosphatic class of concentrated organic manures, bonemeal and bone super are the most important. On the basis of the bovine population, their mortality and slaughter rates, the production of bones in this Province may be estimated at 150,000 tons per annum. But the quantity of bones actually collected is far below the estimated figure and is only about 25,000 to 30,000 tons. The rest is either not collected at all or is exported to foreign countries. During the five years ending with 1937–38, the average annual export of bones from India to foreign countries for purposes of manure was 16,896 tons. The net annual supplies of bones to Madras from other Provinces and States during 1938–39 to 1940–41 were 6,555 tons. Together with the estimated actual collection of 30,000 tons, the net available supply of bones comes to about 36,555 tons. Allowing for milling losses, the total available quantity of bonemeal will be about 32,900 tons. If, however, the entire estimated supply of 150,000 tons is actually collected the quantity that will remain in the country after leaving a margin of 10,000 tons for export will be 140,000 tons of bones or 124,000 tons of fine bonemeal.

There are a dozen fairly large factories engaged in bone crushing in this Province. The total quantity of bonemeal produced annually by all the factories is estimated at 20,000 tons. Bonemeal contains 4·4 per cent nitrogen and 23·6 per cent phosphoric acid.

There are no bone markets in the Province. The factory owners have their agents and sub-agents distributed over the various parts of the country. The village agents who are usually local people gather the bones from the Harijans who are the actual bone collectors and send them on to the nearest railway station where the bones received from various parts are assembled and finally booked to the factory points. Agents are paid commissions or monthly salaries. The prices of bones prevailing at a factory point, therefore, largely depend on the distance along which the bones have to travel and consequently there is wide variation in prices of bones obtained by a factory.

Fish manures

161. The bye-products of marine fishing are important sources of fish manure and guanos which are both nitrogenous and phosphatic in their constitution. They consist of dried fish unfit for human consumption, fish guanos, the cake left after pressing the fish oil, and pitted fish and offal and other refuse from fish-curing yards. Waste products in prawn curing also yield small quantities. There is wide variation in the quantities produced as they are in turn dependent on the volume of catches. In the following table are given the quantities available with their manurial constituents :—

Kind of manure.	Production.	Net available after export.	Percentage of	
			Nitrogen.	Phosphoric acid.
(1)	(2)	(3)	(4)	(5)
	IN TONS.	IN TONS.		
Fish manure	1,500	460	7	7
Fish guano	1,125	340	8	8
Prawn shell manure	200	200	6	4
Fish offal or pit manure	100	100	(Varies widely.)	

The average quantity of fish manure and fish guano exported from this Province during the period 1935–36 to 1939–40 amounted to 790 tons and 533 tons, respectively, per annum. Ceylon is the sole purchaser and usually accounted for thirty to forty per cent of the total production of this Province. Planters of Mysore and Coorg are also regular buyers of fish manure and fish guano from the West Coast. At a moderate estimate, they purchase about twenty-five per cent of these products. The fish manure and guano that remain in the Province may, therefore, be roughly estimated to be in the neighbourhood of 460 tons and 340 tons respectively.

Among other natural sources of manure in the Province, the most important is wood ash, the product of burning fuel in the millions of hearths in the homes distributed all over the countryside. It is difficult to frame even an approximate estimate of the quantity available, because in many parts of the Province, wood ash is rarely collected or conserved. On the other hand, in some districts like Malabar, the cultivators take assiduous care to conserve, even very small quantities of the available wood ash. This can be explained as due to the poverty of the West Coast soils in potash content and the fact that ryots have for a long time appreciated the increase in yields obtained by the application of wood ash, whereas the potash deficiency is not so acute in other districts. The total wood fuel utilisation of the Province is around 2½ million tons and a 2 per cent output of ash will result in 50,000 tons wood ash. Allowing for utilisation of one-third of this quantity for manuring purposes, the wood ash available for agriculture will be 16,000 tons equivalent to 1,000 tons of potash.

For the supply of phosphatic manures, Madras is fortunate in having a two million ton deposit of mineral rock phosphate in the Trichinopoly nodules of that district. This source has not been exploited to any tangible extent, owing to difficulties in their economic utilization. Recently the Indian Institute of Science, Bangalore, has suggested a method to make the nodules soluble as plant food and field trials are in progress with the phosphate made by this process. With the full utilization of modern methods of scientific technique the day is not far off when this large source will be fully and economically exploited for the benefit of the large mass of agriculturists of the Province.

Artificial fertilisers

162. An important factor that has contributed to the increase in agricultural production in the U.S.A. and the Continent of Europe is the introduction of synthetic fertilisers. [1] The fixation of atmospheric nitrogen as a result of scientific and engineering advances has brought about a tremendous change in the last 25 or 30 years in the relative importance of the nitrogen sources dependent upon chemical production. At the beginning of this century, two-thirds of the world's supply of nitrogen was obtained from Chile and the rest from the manufacture of coke and gas. Nearly four decades later, about three-fourths of the world's needed supply of nitrogen was being obtained from the air with less than 7 per cent from the Chilean nitrate deposits.

Thus the application of chemical fertilisers has become an accepted practice in modern agriculture. But their continuous and sole application has deleterious effects on the soil due to various causes. It should therefore be supplemental to bulky organic manures like green manures or cattle manure. The common chemical fertilisers used in South India are—

(1) Ammonium sulphate and Sodium nitrate in the nitrogenous group.

(2) Super-phosphate ordinary and concentrated and basic slag in the phosphatic group.

(3) Potassium sulphate, Kainit in the potash group.

Others, like Ammophos, Nicifos and Potassium nitrate are also used to a limited extent. India has been almost entirely dependent on foreign countries for the supply of chemical fertilisers except for the small quantities of Ammonium sulphate recovered as a bye-product from coal at the Tata's works at Jamshedpur and in the coal fields of Bengal and Bihar. The utilization of artificial fertilisers started with the plantation crops and gradually its use has extended to field crops as well. [2] The average annual imports of

[1] Soils and Men—United States Year Book of Agriculture, 1938, page 365.
[2] Industrial Sub-Committee (Chemical Section) Report, page 3.

artificial manures for the period 1935–40 for all India and the share of Madras are given below :—

Name of fertilizers.	Imports into India.	Share of Madras.
	IN TONS.	IN TONS.
Ammonium sulphate	63,502	31,152
Nitrate of soda	3,531	740
Other nitrogenous fertilizers	571	126
Superphosphate	6,889	5,031
Other phosphatic fertilizers	3,327	3,026
Ammonium phosphate	3,072	579
Muriate of potash	2,061	1,515
Other potash fertilizers	1,081	471
Total ..	83,834	42,640

163. The total quantity of plant food removed by the more important crops annually from Madras soils has been estimated earlier at 887,000 tons nitrogen, 372,000 tons phosphoric acid and 894,000 tons of potash. The following statement based on the studies summarized above indicates at a glance the available manure supplies in the Province :—

——	Nitrogen.	Phosphoric acid.	Potash.
(1)	(2)	(3)	(4)
Sheep manure	25,090	16,900	26,000
Cattle manure	221,205	112,416	217,579
Compost manure ..	5,092	7,638	5,092
Groundnut cake	19,680	3,444	2,952
Neem cake	60	16	20
Castor cake	540	228	84
Pungam cake	23	8	5
Bonemeal	5,456	29,264	..
Fish manure	105	105	..
Fish guano	90	90	..
Pawn shell manure ..	12	8	..
Wood ash	..	..	1,000
Artificial fertilizers ..	4,662	1,077	494
Total ..	282,015 or 282,000	171,194 or 171,000	253,226 or 253,000

There is thus a deficit of 605,000 tons of nitrogen, 201,000 tons of phosphoric acid and 641,000 tons of potash. The manure problem of this Province, therefore, is the problem of making up this deficit. The soil surveys to which reference has already been made have shown that Madras soils are not to any great extent deficient in phosphates and potash and the problem of plant food deficiency is more a deficiency of nitrogen. The nitrogen deficiency is not only a problem of Madras but a problem in all tropical countries where soil nitrogen is lost more rapidly than in temperate regions. Therefore, the manure problem resolves itself into one of finding ways and means to recoup the nitrogen deficiency in the soil by augmenting the available supplies. The

primary source of soil nitrogen is the free nitrogen of the air, which is fixed by two processes, the natural and artificial. Lightning discharges unite nitrogen and oxygen to form oxides of nitrogen which combine with the moisture in the air and are washed down with the rain; but such quantities possibly entering the soil are small in relation to total requirements for plant growth. [1] It is estimated that 5 to 7 lb. of nitrogen per acre annually are added to the soil in this way, but these estimates relate to foreign countries like United States of America and England and no data are available for Indian conditions. It has, however, been admitted at various times by authorities that the nitrogen supply to the soil by lightning discharges under tropical conditions is much more than under temperate conditions. Even on a conservative estimate of 7 lb. per acre, the total supply of nitrogen to the 32 million acres of cultivated land in the Province is equal to 100,000 tons nitrogen, which is about equal to the total nitrogen obtained from all the existing manure resources of the Province. One is led to conclude that the explanation for the maintenance of a minimum of soil fertility in many districts, in spite of cropping spread over centuries, is due to this phenomenon. However, this may partly help but does not solve the nitrogen famine, and other methods have to be resorted to, to replenish the deficiency.

The problem of nitrogen deficiency is being tackled in three directions—

(1) by the conservation and better utilization of the existing sources of supply of manures.

(2) by the extension of cultivation of green manure crops, and

(3) by manufacture of synthetic fertilizers like ammonium sulphate.

164. In the category of conservation of manures may be mentioned the various measures taken by the Agricultural Department for the better preservation of cattle manure in the villages. For the better utilization of existing supplies of municipal waste and other refuse matter for manurial purposes, the Government are assisting municipalities in the manufacture of compost manure. As a result of special investigations carried out at the Indian Institute of Science, Bangalore, under the auspices of the Imperial Council of Agricultural Research, an improved system of compost-making known as the 'Bangalore Process' has been evolved. With financial assistance from the Imperial Council of Agricultural Research, the Government of Madras sanctioned a scheme for the training of an Assistant Agricultural Chemist for three months and a First-class Health Officer for a period of six months in the 'Bangalore Process' for making compost out of town refuse and for training 38 Sanitary Inspectors in that process, at two centres—Bezwada in the north and Coimbatore in the south—and for starting composting work in 38 municipalities and major panchayats. The scheme was initiated on 1st August 1943. The

[1] Soils and Men—United States Year Book of Agriculture, 1938, page 364.

training of the first batch of 18 Sanitary Inspectors was begun at Bezwada on the 10th December 1943 and it was closed by the first week of February 1944. They have been sent back to the respective municipalities and preparation of compost manure by the "Bangalore Process" has been started in many of them.

The training of the second batch of 20 Sanitary Inspectors deputed by other municipalities and panchayats, began at Coimbatore on 1st March 1944 and the training was over on 31st May 1944. In December 1945, orders were issued for the training in compost-making of a further batch of 40 Sanitary Inspectors for a period of two weeks at two centres, viz., Bezwada and Virudunagar.

165. The Government in the Local Administration Department have advised municipal councils to take steps for the manufacture of compost manure out of municipal rubbish and nightsoil from 1st April 1944 and to sell at the end of each year the compost so manufactured either to ryots direct or through co-operative societies. The following statement shows the compost sold by local bodies direct and through co-operative societies for the period from 1st September 1944 to 31st August 1945 :—

Agency.	Compost sold in cubic feet.	Value.
		RS.
Local bodies	86,399	1,296
Co-operative societies	605,992	9,089
Total ..	692,391	10,385

The sale of compost to ryots is subsidized at the rate of 12 annas per 50 cubic feet of compost actually applied to land under crops. The subsidy is met by the Government of India. The municipalities and panchayats which have not yet undertaken the manufacture of compost have been advised to lease out their nightsoil and rubbish to co-operative societies for an amount equal to the average rental of five years ending with 31st March 1943 instead of selling them in public auction.

166. With a view to conserving manures within the Province, the Government have prohibited the export of oilcakes, bones, facture of compost have been advised to lease out their nightsoil manures and green manure seeds except under permits issued by the Director of Agriculture. In order to prevent the evasion of the order prohibiting the export of oilcake, the Government have ordered that no person shall export groundnuts, gingelly and castor and other oil seeds notified by the Commissioner of Civil Supplies except under permits issued by him or any other officer specially authorized by him. The waggon shortage for the movement of manure from one place to another caused by the war has added to the difficulties. In the interests of the ryots the entire quantity of groundnut cake available has to be distributed evenly to all

districts. A total quantity of about 86,985 tons of groundnut cake is surplus in eight districts. The deficits in other districts have to be supplied from the surplus districts. The Government have therefore sanctioned a zoning scheme which aims at grouping the surplus and deficit districts, regulating the distribution of surplus and controlling movements in order to minimise transport difficulties. To implement the scheme the Government have passed the Madras Oilcake (Movement Control) Order, 1943, which *inter alia* provides for the exports of oilcake from one district to another only under permits issued by the Director of Agriculture or an officer specially authorized by him.

167. A zoning scheme has also been introduced with a view to relieve pressure on railway transport and to avoid unnecessary cross-movements of raw bones to the different bone-crushing mills and for distributing the crushed bonemeal from these mills to places where they are required for manurial purposes.

The Government have fixed the maximum prices for groundnut cake sold ex-mill in the eight producing districts.[1] The power to control the price of manures has been delegated to the Director of Agriculture, who has fixed the wholesale and retail prices of groundnut cake in all the districts of the Province.

At a meeting of the Food Council held in October 1943, it was suggested that steps should be taken to encourage the collection of more bones in the Province and their conversion into bonemeal. The Government have directed the Collectors, the Director of Agriculture, and the Director of Public Health to instruct their subordinate officers to do propaganda to encourage the collection of bones in villages and municipal areas and in places where bone mills do not have their collecting agency.

The Government have sanctioned several schemes in order to increase the production of fish which is an important article of diet, which will result in an increase in their bye-products and contribute to the supplies of manure.

With a view to making manures easily available to the ryots, the Government sanctioned to the Director of Agriculture a permanent advance of Rs. 52 lakhs for the purchase and sale of manures. It was later increased to Rs. 102 lakhs in 1944–45. The sale of manures is subsidized by the Government by omitting the overhead charges from the sale price. This subsidy during 1945–46 will amount to Rs. 15·18 lakhs. The manures are sold on cash basis but Takkavi loans are issued to the ryots freely for the purchase of manures.

[2] Sanction was accorded to the distribution to deserving ryots in each district free of cost of manure to the extent of Rs. 200 and of seed up to Rs. 100 during 1943–44. During 1944–45 the same concession was granted subject to the modification that the limit for free supply of manure was raised to Rs. 2,000 in each district.

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[1] Madras, Vizagapatam, Guntur, Bellary, Kurnool, Anantapur, Chittoor and North Arcot.

[2] Grow More Food Pamphlet—1945, pages 19–20.

168. The extension of cultivation of leguminous green manure crops which is primarily intended to add organic matter to the soil, incidentally increases the nitrogen supply of the soil. Various leguminous crops add varying quantities of nitrogen but a safe estimate from a normal crop is about 50 lb. nitrogen per acre which is equivalent to about one-eighth ton of ammonium sulphate.

[1]Green manure crops grown on wet or irrigated dry land, are entitled to the following concessions whether they are grown for the ryots' own use or for sale :—

(*a*) When they are raised on any land as the sole crop of the year the charge to be made will be—

(i) in the case of dry land no remission of assessment will be granted but water-cess will not be charged;

(ii) in the case of single crop wet land no assessment will be charged whether there was a possibility of raising another crop or not;

(iii) in the case of registered double crop wet lands if the supply of water was sufficient for only one wet crop, the full double crop wet assessment will be remitted; but if the supply was sufficient for two wet crops, the single wet assessment will be charged and the difference remitted;

(iv) compounded double crop lands will be treated in the same way as ordinary double crop lands.

(*b*) When they are raised in addition to other crops they will be exempt from water-cess.

The remissions contemplated in clauses (*a*) (ii), (iii) and (iv) are granted only in respect of the areas actually cultivated with the green manure crops. The Government reserve the right to withdraw the concessions after a year's notice either generally or in any particular locality. These concessions have been in existence for a long time and are embodied in the standing orders of the Board of Revenue.

169. With a view to increasing the supply of manure available to villages bordering on reserve forests the Government have given the following concessions :—

(1) The removal of silt from tank beds and ponds on payment of a fee of two annas and four annas per cart-load, respectively, till the working plan is revised.

(2) As a temporary measure, the removal of dry leaves in the Kodaiakadu reserved forest in the Tanjore district on payment of a fee.

(3) Reduction for the duration of the war of the rate payable for the removal of green manure leaf from reserved forests, by 50 per cent.

(4) As a temporary measure the removal of dead leaves and leaf mould from reserved forests on permits issued by the Forest Department at a seigniorage fee of four annas per cart-load except in certain districts where a different rate is already in force.

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[1] Villagers' Calendar, 1942, page 157.

170. For a permanent and large source of nitrogen, we have to look forward to the manufacture of synthetic nitrogenous fertilizers like ammonium sulphate. The application of synthetic fertilizers has become an essential element in farming in all countries practising modern agricultural methods. The Technical Mission on Fertilizers appointed by the Government of India has recommended a single plant of 350,000 tons capacity for the whole of India. The Chemicals Sub-Committee of the Madras Government discussed the need for developing the sulphate of ammonia industry in this Province. As Madras has all along been a very large market for ammonium sulphate and as many of the raw materials necessary for its manufacture are available in this Province, the Sub-Committee was unanimously of the view that a factory for the manufacture of sulphate of ammonia should be established in the south. The matter is receiving the attention of the Government. The Travancore State has already arranged for the installation of a plant for the manufacture of 60,000 tons of ammonium sulphate per annum, in collaboration with the Governments of Madras and Cochin. From the output of this plant 20,000 tons are to be distributed in the Madras Province.

Our knowledge of soil conditions in relation to plant growth is still in its early stages. There should be an efficient estimation of the country's fertilizer requirements in relation to soils and crops by a co-ordinated series of field experiments under the widely different conditions existing in the Province, to enable a correct appraisal of the manure position. What is required is not a mere soil study, but a study of soil in relation to crop, region by region. "Dosage" by reference to deficiency is the central factor influencing plant growth and this calls for studies of plant life in deficient and healthy conditions, side by side.

Soil erosion

171. The problem of soil erosion has presented itself in varying degrees from the time when man first turned the top soil to grow food. But in modern times, the problem has become accentuated with the increasing intensity of cultivation. Forest lands are cleared and extensive grass lands are brought under the plough, but methods to conserve the top layers of the soil are not usually followed and the evil of erosion increases cumulatively.

"Soil erosion" is the loosening of the soil from its bed and its transportation from one place to another by the action of wind or water in motion. Soil erosion is of two kinds, geologic erosion and accelerated erosion. Under natural conditions vegetation retards transportation of soil material and acts as a check against excessive erosion. A certain amount of erosion that takes place slowly, is compensated by the formation of soil by natural weathering processes. Thus geologic erosion does not disturb the natural environment. On the other hand accelerated erosion occurs in cleared or

[1] Report of the Sub-Committee on Chemicals—Industries Sub-Committee Report, 1944—Appendix on page 25.

SHEET EROSION

SHEET EROSION

cultivated lands, where the natural balance existing between soil, its vegetational cover and climate is disturbed by cultivation. It removes surface soil at a much faster rate than soil forming processes can build it up. This type of erosion seriously affects land economy and requires to be combated by energetic measures.

When compared to other Provinces, the erosion problem is not very acute in this Province, because the Indian Peninsula is a very old geological formation having existed as a land area since the palæozoic era. The soils derived from the weathering of the granitic and gneissic bed rocks are comparatively very stable. Moreover, the land development in the south has been slower than in the north as the major invasions of India have taken place from the north. As a result the denudation of uplands has not progressed to the same extent.

Causes of soil erosion

172. The two agencies that cause soil erosion are wind and water. Their velocity or flow largely determines the magnitude of the erosion. The topography, particularly the gradient and the nature of the soil also play an important part in influencing the degree of erosion.

Wind erosion

173. When dry soils without cover are exposed to wind, wind erosion results. Taking the Province as a whole wind erosion is not as extensive as water erosion. In the Hagari and Pennar rivers in the districts of Bellary and Anantapur sand dunes are common. The south-west monsoon winds carry sands from these river beds to great distances and deposit them in the black soil tracts, which are rendered unfit for cultivation after some years.

Wind erosion of a different type is present in the Tinnevelly district. Here again the south-west monsoon winds carry eastwards the light soil from cultivated lands skirting the eastern edge of the ghats until they meet the sea breezes flowing in the opposite direction from the Bay of Bengal. The light sand is deposited to form sandhills known as " Taris ".

Erosion due to water

174. As already mentioned the most serious and extensive type of erosion that occurs in many parts of the Province is caused by water. This type of erosion is taking place in the coastal districts, in the black soil areas of the Ceded Districts and in the hilly tracts of the Nilgiris. The worst example of soil erosion by water is found in the Nilgiris. On the outer slopes of these hills, the clearance of natural forests to form plantations has resulted in serious soil run off. In the vicinity of the towns of Ootacamund, Coonoor and Kotagiri, the opening up of land for cultivation of potatoes has had a similar result. Large areas are seen today where the top soil has been washed off. The fields either lie fallow or the ryot cultivates the less fertile subsoil with the aid of artificial

fertilizers. The Coonoor and Kallar rivers carry the muddy fertile silt with every fall of rain. Erosion is also extensive on the Nilgiri outer slopes overlooking the Bhavani river. Soil erosion by rain water is also taking place on most of the dry-cultivated lands in the plains resulting in their gradual loss of fertility. The black soils of the Ceded Districts stand prominent among the areas so affected.

The two main types of water erosion are " Sheet Erosion " and " gullying ". Sheet erosion affects practically all cultivated lands and removes top soil materials which have taken centuries for their accumulation and development. When the top soils are removed, tillage has to be done on lower layers which have poorer physical qualities. The removal of the top soil with its organic matter increases its susceptibility to further erosion. These and similar conditions bring about accelerated run off with destructive results.

With the removal of the top soil material the nutrients therein are also lost. Nitrogen and potash suffer particularly heavy losses. Results of experiments in the Hagari Agricultural Station in Bellary district have shown that on an average about 40 per cent of the rain water received during the rainy season, July to October, is usually lost as surface run off carrying with it about 8 tons of silt per acre. On an average every inch of water from surface run off carries with it about one and a half tons of rich soil. In many parts of the Nilgiris where the land has a slope of 1 in 10, the run off is nearly two-thirds of the total rainfall received. Chemical and physical analysis of the samples of silt and water has shown that the richest part of the soil is washed away by erosion.

Chemical analysis of soil and run off silt—Hagari Dry Farm

Heads of analysis.	Soil first foot layer per cent.	Run off silt per cent.
Loss on ignition	3·12	7·14
Insoluable matter	75·49	63·95
Potash	0·29	1·28
Phosphoric acid	0·054	0·041
Nitrogen	0·024	0·043
Iron and aluminium	13·19	20·95
Lime	3·45	3·83
Magnesia	0·92	1·52

175. It is observed that the silt that is washed off the land is richer than the original soil. Much of the organic matter present in the soil is lost. Potash in the silt is nearly four times that contained in the soil.

Intensified sheet erosion, when it gathers sufficient velocity, has a cutting action on the soil. If there is any depression in the field a gully is formed where soil and water collect and flow out rapidly. As more surface is washed away and the gullies extend,

GULLY EROSION

clefts slowly appear on the top soil; cutting right through to the subsoil so that erosion then proceeds at a greater rate than before. The gullies produce excessive drainage, the level of the underground water is lowered, and even a moderate drought will cause the water-supply to be below the minimum necessary for soil fertility. Of the two types of erosion, gullying is more spectacular, while sheet erosion is insidious and more dangerous. The destructive action due to sheet erosion may not be felt in the early stages. Due to continuous erosion, the fertility and the productive capacity of the land get diminished. Sheet erosion when neglected ends in gully erosion.

Methods of control

176. Soil erosion is largely a man-made problem caused by the misuse of land and the removal of its natural vegetative cover. Therefore the basis for all soil conservation measures is the realization of the natural limitations on the uses to which land may be put and the application of these limitations in land utilization. This fact is now widely realized and plans for the better utilization of land are now being understood as an essential part of all agricultural development.

Erosion control measures aim at preventing surface run off and securing soil stabilization. Steps are taken to clothe the land with natural vegetation and to preserve the growth. The remedial measures now adopted in all countries to prevent or reduce surface run off consist of contour bunding, contour trenching, gully reclaiming, terracing, regulated forestry, controlled grazing, revegetation, selective weeding, cover cropping, mixed cropping, crop rotation and strip cropping. The first three methods are mechanical and the remaining are biological. Certain of these methods are of limited application to Indian conditions.

177. As velocity of water is dependent on slope, it is generally considered advisable to cultivate only lands above a critical slope varying between 1 in 4 and 1 in 7. Wherever lands with steeper slopes have to be cultivated, it should be done after terracing. When gullies are formed by severe erosion, it is essential that they are reclaimed as a preliminary to terracing. The reclamation of gullies is done by securing vegetative growth in the gullies or by means of check dams. The most important way of preventing erosion under South Indian conditions is by " Contour bunding." Contour bunding prevents surface run off, enables the retention of more moisture in the field, increases sub-soil water and raises the water table leading to the development of copious springs and the raising of water level in wells. This method has been practised in this country from time immemorial. Recently, the practice has been made more scientific, leading to better efficiency. It is not, however, always possible to get the co-operation of all the landholders in a tract or area and bundings in isolated holdings do not confer much benefit to the land commensurate with the expenditure.

Such unscientific bundings are common in parts of the Ceded Districts, Coimbatore, Salem and Tinnevelly. Contour trenching is another method of controlling soil erosion. This consists in the excavation of trenches along a uniform level across the slope in the top portion of a catchment and forming bunds at the trenches. By this method contour bunds lower down are protected from the direct run off from the upper portions of the catchment. Rain water is held up in the slopes for a long time and this helps the growth of vegetation. Contour trenching has not been attempted in Madras, though it has been experimented in the Punjab and in the United Provinces.

178. Among the biological methods of erosion control, the adoption of proper crop husbandry is important. It is observed that a cover of grass is about five times more effective than bare soil in the control of run off waters and 65 times more so in the control of soil losses. Results of studies made in the Hagari station on the protective cover provided by a groundnut crop are given below :—

Run off results, 1940—Hagari Farm (crop groundnut)

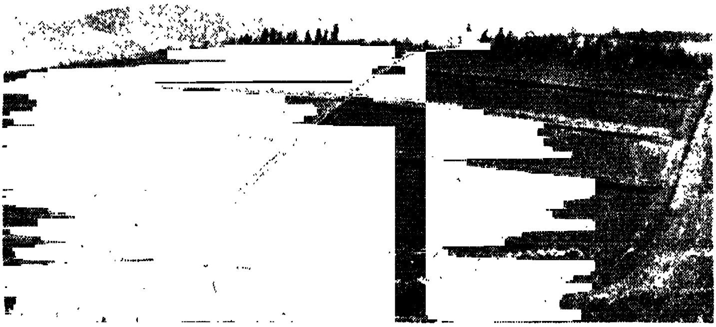
	Clean fallow.	Cropped with groundnut.
1. Number of days when there was run off	11	5
2. Total rainfall on days on which run off was recorded in either of the plots	7·63 inches.	7·63 inches.
3. Rain water lost	2·81 inches.	1·65 inches.
4. Silt washed out per acre	1·83 tons.	0·98 tons.

It is seen that losses of water and soil are reduced by 50 per cent by the groundnut crop. The cover crop helps to intercept the rainfall and reduce its force on the soil. The spread of the crop offers mechanical obstruction to the flow of water. Rotation of crops helps to reduce erosion, apart from maintaining soil fertility. This method is extensively practised in all the dry districts of the Province.

Strip cropping is another biological method of erosion control. This consists in planting densely growing or fibrous rooted crop or crops in alternate strips along contours of erosible fields. In the black soil areas of the Ceded Districts, mixtures of setaria and cotton are sown in the mungari or early season. Contour cultivation and contour planting also go a long way in arresting surface run off. They should be combined with practices like terracing and bunding. It may be added that proper maintenance of grazing lands, tree planting in waste areas and afforestation on hill slopes will be of considerable help in controlling erosion.

State action for prevention of soil erosion

179. With the recent growth of interest in soil conservation, and the increasing appreciation of the relationship of soil to national



BUNDING

wealth, it is fully realized that the responsibility for soil conservation properly devolves upon the State. [1] In the United States of America, assistance is given to individual farmers by the Soil Conservation Service, the Civilian Conservation Corps, and the Tennessee Valley Authority as part of a national programme of soil conservation. In India, soil conservation work by the state has been attempted to some extent in certain Provinces, but the work is not anywhere commensurate with the magnitude of the problem.

A great deal of bunding work has been done in the Bijapur district of the Bombay Presidency and the results are reported to be encouraging. The system followed is " block bunding " comprising lands of 200 to 500 acres in extent or village development projects comprising 500 to 1,000 acres, under the guidance of a special bunding staff directed by the Director of Agriculture. These schemes consist in putting up contour bunds at intervals of 150 or 200 feet, or at contours falling by 3 feet and each contour bund is provided with one or two suitable waste weirs. It is learnt that more than one lakh of acres have been bunded at a cost of Rs. 12 lakhs. Two Land Development Officers are in charge of the scheme.

180. In Madras, an experiment on contour bunding was attempted at the Hagari Dry Farming Station in the Bellary district. It was found that in counter-bunded plots the yield of cholam, both grain and straw, was higher than in the unbunded plots. A reference has been made already to the results obtained in certain other experimental studies made at this station. The Government are considering a scheme of contour bunding on the lines of the Bijapur scheme over a wide area in the Ceded Districts. They have sanctioned the necessary staff for the preliminary investigation of the scheme for contour bunding on 25,000 acres in the Bellary and Anantapur districts. In order to legalise the operations in respect of contour bunding on private lands and to enforce upon the ryots the duty of maintaining and repairing contour bunds when once they have been formed, the question of enacting legislation on the model of the Bombay Land Improvement Schemes Act, 1942, is under the consideration of the Government.

With a view to preventing soil erosion on the hills, assignment of lands by the Government for private cultivation is made subject to certain conditions and restrictions. No land of a slope steeper than 1 in 4 would be assigned. With a view to providing vegetative cover, good " shola " lands could be only leased out for long periods for cardamom cultivation and not assigned permanently. New assignments are subject to the condition that the land shall be adequately terraced to the satisfaction of the District Collector and ploughed only along the contour. Failure to comply with the condition will result in the resumption of the land without compensation. These restrictions are in force on the Nilgiris,

[1] **" Soils and Men "—United States Year Book, 1938, page 283.**

Anamalai and Kodaikanals. Unfortunately, the restrictions apply only to new assignments and not to the other lands cultivated on the hills.

Though propaganda has been done by the Agricultural Department on the advantages of contour ploughing and planting, the results are not very encouraging. "The Forest Sub-Committee of the Post-War Reconstruction Committee recommended that "the land, the protection of which is necessary for the preservation of the general climatic and physical condition of the country and for the conservation of water in the catchment areas, should be defined and placed under proper management, the experience and special knowledge of the Forest Department being utilized to the maximum for the purpose." The Sub-Committee also recommended that "soil conservation circles should be formed in the Province to deal with land management and regulation of grazing with due regard to the needs of the cattle population and the growing of trees whether as a protection against floods, erosion or desiccation or to supply the needs of the rural population." To implement these recommendations the Government have sanctioned as a first step a soil conservation division under an officer of the Forest Department to cover the Nilgiri district and the adjoining Attapadi Valley of the Malabar and Coimbatore districts. The work of this organization will be the protection of forest trees, the planting of soil binding plants and trees and the making of suitable ditches which are so constructed with pits that the top soil though temporarily washed away as always happens in heavy monsoon rains, can be redumped back on the land.

To make state action more effective, close co-operation from individual farmers will be necessary. To compel such co-operation there is an urgent need for the enactment of a state soil conservation law. Soil conservation has in fact become an integral part of the wider study of " Land Utilization " in which much good work has been done in Italy and the United States of America. The precise methods by which the co-operation of the public is harnessed are matters of detail depending on the circumstances of each country. Progress can, however, be achieved only by a combination of Government initiative and ryots' co-operation; in other words by " Permissive " laws that induce ryots to come forward and form societies for these purposes. The subject is of sufficient importance for separate and special study.

Agricultural Implements

181. "[2]Agricultural implements in India are on the whole well adapted to local conditions. They are within the capacity of the draught oxen, comparatively inexpensive, light and portable, easily made and what is perhaps of even greater importance, easily repaired and they are constructed of materials which can be readily obtained." However, there is undoubtedly very great scope for

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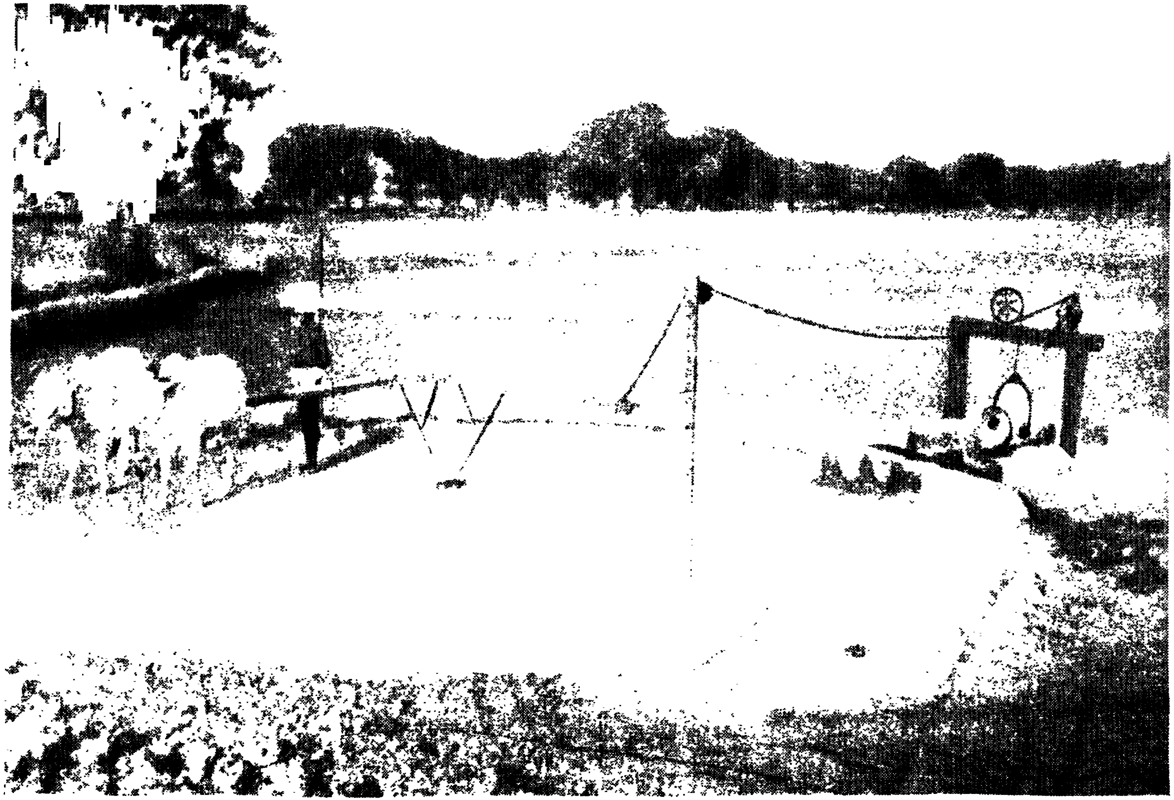
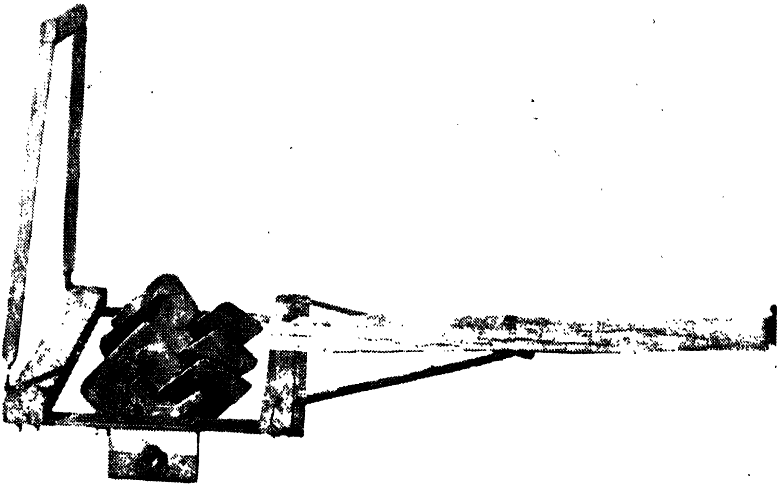
[1] Report of the Forest Sub-Committee, 1944, page 3.
[2] Report of the Royal Commission on Agriculture in India, 1928, page 107.



CIRCULAR MHOTE

RESULTS OF SOME CULTURAL PRACTICES

Use of Country plough v. Improved iron plough



WETLAND PUDDLER

improvement in these implements according to modern concepts of soil science and also for better efficiency in agricultural operations.

The country plough continues to be the main implement of cultivation. Although the advantages of improved iron ploughs have been demonstrated in the ryot's fields time and again their spread in the country is not as rapid as one would wish. The country plough is an implement which the farmer has been accustomed to work with for generations and it is not therefore easy to replace it. The iron plough is also more expensive. It is too heavy to be carried to the field and drawn by his under-sized animals. The mould board which forms a part of all iron ploughs which helps to invert the soil does not fit in with his mode of turning at headlands. It cannot be easily repaired in the village. Spares have to be obtained from the manufacturer or a nearby dealer whom he does not contact in everyday life.

While much of this is seemingly true, the disadvantages of iron ploughs from the point of view of the ryots are more apparent than real. The poor yields of crops are partially attributable to poor tillage. Moreover many ryots do not find it difficult to operate iron ploughs once they get over the initial inertia. The work of expansion in the use of iron ploughs suffers like all other agricultural improvements for want of sufficient publicity. [1]The total number of ploughs in use in the Province is 3,878,868 of which 52,184 are iron ploughs, which is only just a little over 1 per cent.

Apart from the plough there are other indigenous implements employed by cultivators for the various agricultural operations. For the wet land ryot, the levelling board is an important contrivance used in levelling the puddled field after ploughing. For a dry land farmer, a blade harrow, commonly called a " Guntaka " and a row seed sower termed " Gorru " form part of his equipment. The " Guntaka " is used as a harrow for producing soil mulch and for breaking up the crust. Heavy type guntakas are used for lifting groundnut in preference to hand digging.

182. Well irrigation is practised on a large scale and the common water lift worked by a pair of bullocks with a leather bucket is the popular indigenous model. In some districts as in South Arcot, one comes across more efficient lifts like the circular mhotes.

The designing of improved implements to suit local conditions of agricultural practice is an important contribution to better crop production and agricultural efficiency. With a view to improving the existing agricultural implements and machinery, the Agricultural Commission recommended the organization of Agricultural Engineering sections attached to Agricultural Departments, and acting upon the recommendations the Madras Government appointed a Research Engineer. Systematic attempts at agricultural implement improvement and the design of new machinery and contrivances suited to local conditions have been made from

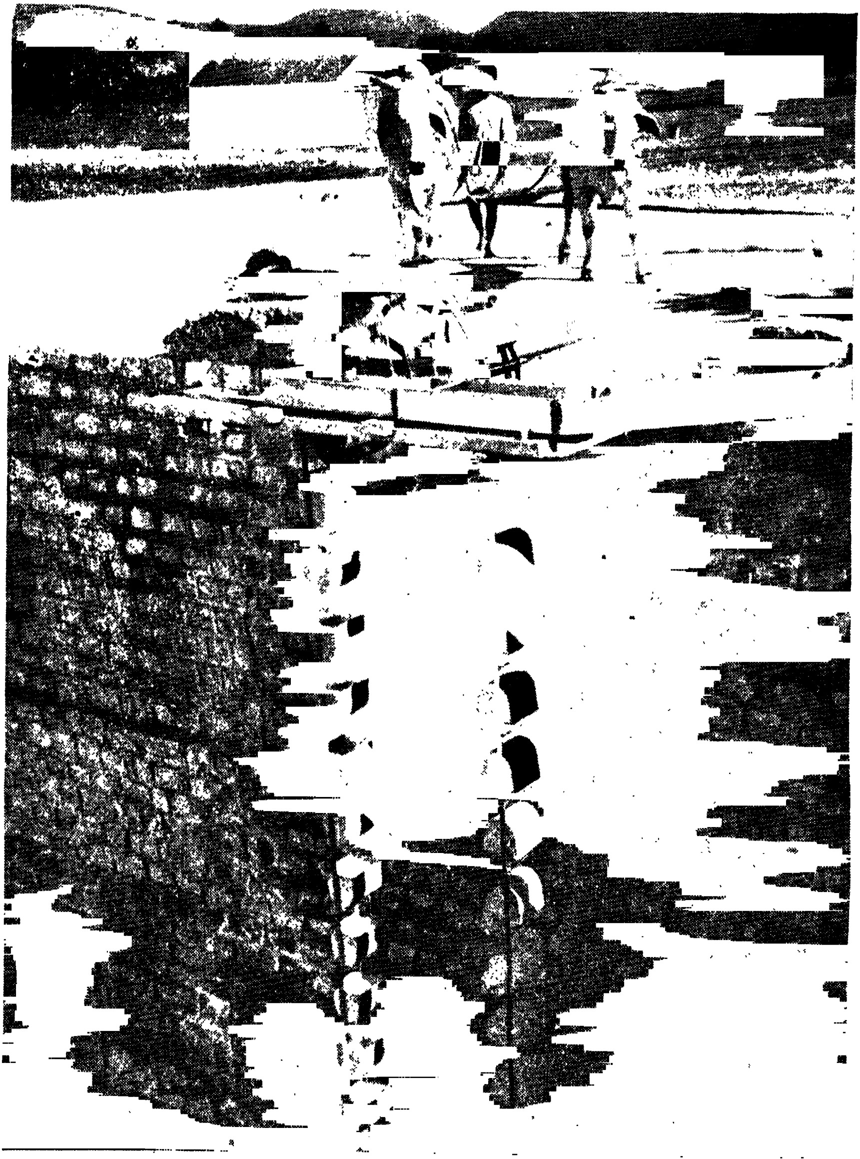
[1] Season and Crop Report, Madras Presidency, 1944–45.

1932 in the Research Engineering workshop as a separate unit in the Research Institute at Coimbatore.

The first problem tackled was the improvement of the plough. This resulted in the steady development of a number of useful types suitable to various tracts and different soil and draught conditions. Simple and cheap designs were evolved for paddy areas, garden land and black soil cultivation. Mould board ploughs with heavy chilled cast iron wearing parts costing little more than an ordinary country plough were produced and sold to agriculturists in large numbers. Therefore the major objection of the ryot regarding cost has been to a certain extent overcome.

Simultaneously several other tillage implements and intercultivating outfits have been designed which have greater efficiency than the indigenous implements and save labour, both human and cattle. For instance the bundformer, is a very simple implement consisting of two outspreading collecting wings fixed on a wooden frame. This is drawn by a pair of bullocks and can form beds for irrigation purposes in 3 or 4 acres of garden land in a day, in districts where lift irrigation is practised, where formerly this laborious operation required more than 20 men. The bundformer has resulted in a saving of two to three rupees per acre in labour costs alone with respect to one item of preparatory cultivation. The larger bundformers are now extensively used for forming bunds to prevent soil erosion in the Ceded Districts. In the same manner the paddy puddler and the disc trampler save considerable labour in wet land operations. The seed drill of the Ceded Districts in a modified form is advocated in other districts as it results in saving in intercultural operations and a better crop with uniform germination. For irrigation from wells by lifts, several improvements have been designed such as the ball bearing mhote wheels and circular water lifts.

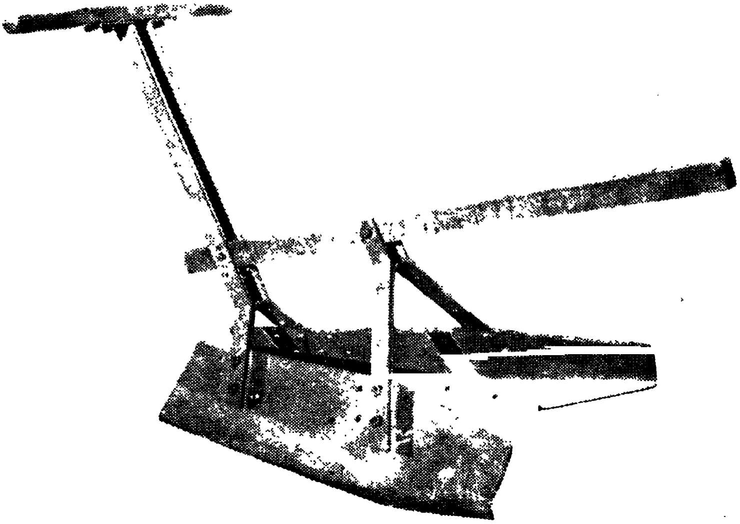
183. Implements have also been designed for the preparation of the harvested produce for the market. Many of them like the turmeric polisher and the grading machines are noted for their simplicity of design. Another important machine is the chaff cutter. The Province has over 5 million acres under cholam whose straw is fed to cattle. The ryot usually cuts the long straw into two or three bits before feeding the cattle and in some districts the straw is fed whole. This leads to enormous waste as the animals find it very difficult to consume the whole straw. A simple hand contrivance to cut the straw into bits is what every farmer would like to have. The old type of imported rotary chaff cutter was not popular on account of its high price and massive design. The need has been met by the design of a simple and efficient foot operated fodder cutter and its large scale manufacture is being arranged. The machine promises to become popular and widely employed by even the average cultivator by virtue of its simplicity, ease of operation and low initial purchase price.



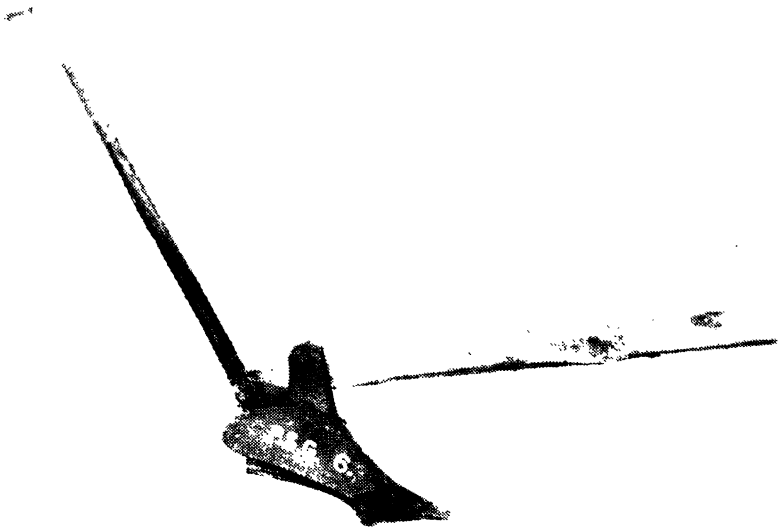
PERSIAN WHEEL

B

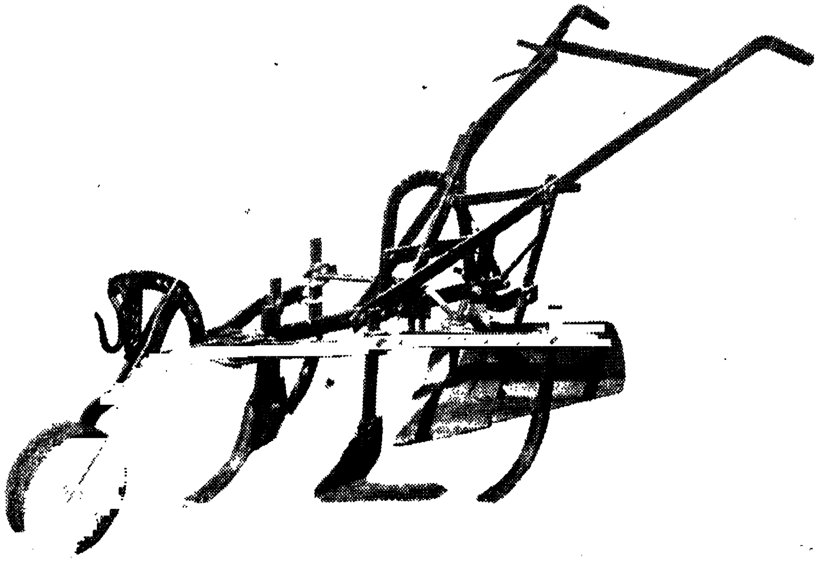
TURMERIC POLISHER



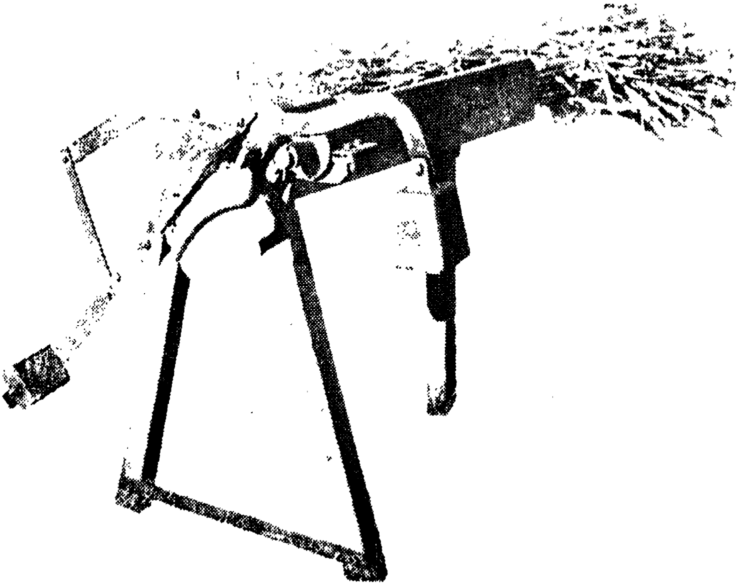
BUND FORMER



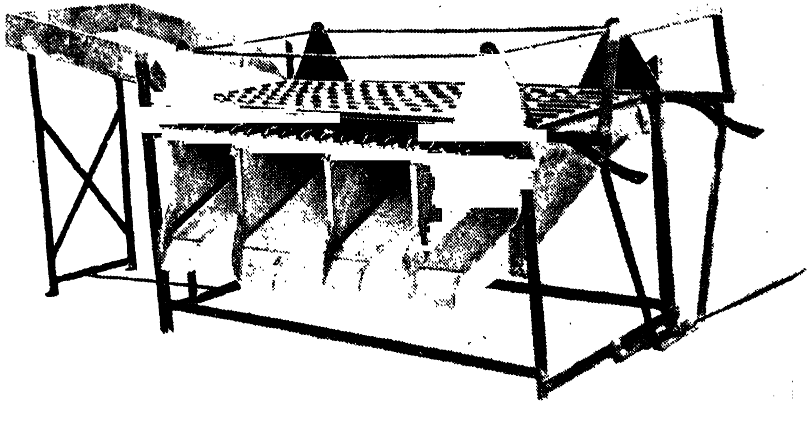
IMPROVED IRON PLOUGH



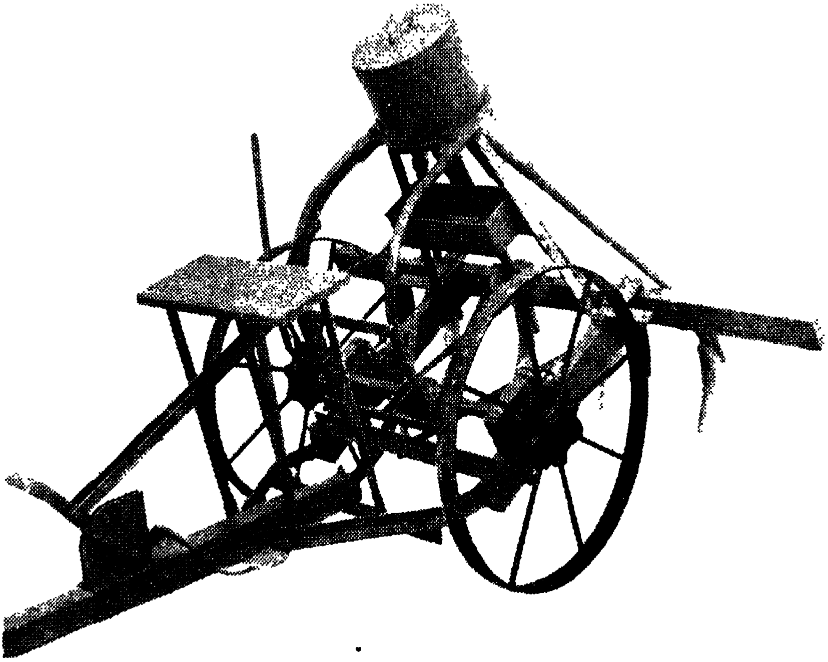
EXPANDING CULTIVATOR



FOOT OPERATED CHAFF CUTTER



FRUIT AND POTATO GRADERS



MECHANICAL SEED DRILL

The shortage of iron and steel as a result of the war has led to a set back in the orderly progress of the utilization of these implements and machines. The annual replacement requirements of iron and steel for agricultural purposes in this Province a.e estimated at about 30,000 tons. Owing to the unsatisfactory supply position only a portion of the requirements of iron and steel is being supplied by the Government of India. The quota allotted is being distributed through the Agricultural Department. A detailed scheme has been worked out for this purpose and is now in operation.

Crop production and improvement

184. The cultivation efficiency of crops in the Province is very low. The land that is already under cultivation is suffering from several defects which if remedied will result in a large increase in production from the same acreage. Some arable land suffers from inability to retain the scarce rainfall, land that is already und r irrigation suffers from deficient drainage, while roads and rail roads obstruct surface flow and cause submersion to the detriment of soil and crop. Tanks have silted up and do not store sufficient water and the ayacuts under the tanks have decreased. Surface erosion is depleting land of its fertile soil. Most soils in the Province have lost their fertility and are in an impoverished state and the yields per acre are far below those of other countries. The major problem at the moment is not so much deficiency in acreage as deficiency in yield.

Crop improvement in the Province has been attempted now for more than three decades by (1) breeding of high yielding strains by pureline selection from the local unselected ryots' bulk seed, (2) by hybridization, (3) introduction and acclimatization of varieties from other provinces or countries, and (4) inducing mutants by artificial means. Plant breeding as an art and a science is of comparatively recent origin. The great biological principles which underlie the science of plant breeding were discovered only in the latter part of the 19th century.

Rice

185. Rice is the largest single crop in the Province and occupies on an average 10·9 million acres producing 4·9 million tons of rice. Madras is the second largest rice producing Province in India being next only to Bengal. Out of the 10·9 million acres, 2·2 million acres are grown under rainfed conditions and the rest under irrigated conditions. Among the districts, Tanjore has the largest area under paddy having 1·2 million acres under the crop and is aptly described as the granary of the south. Malabar has the next largest area with 0·89 million acres but as the crop is grown under rainfed conditions the yield is low. The deltaic districts of the Circars come next in importance.

The paddy crop is cultivated under varying conditions in the different districts of the Province. The two big divisions are

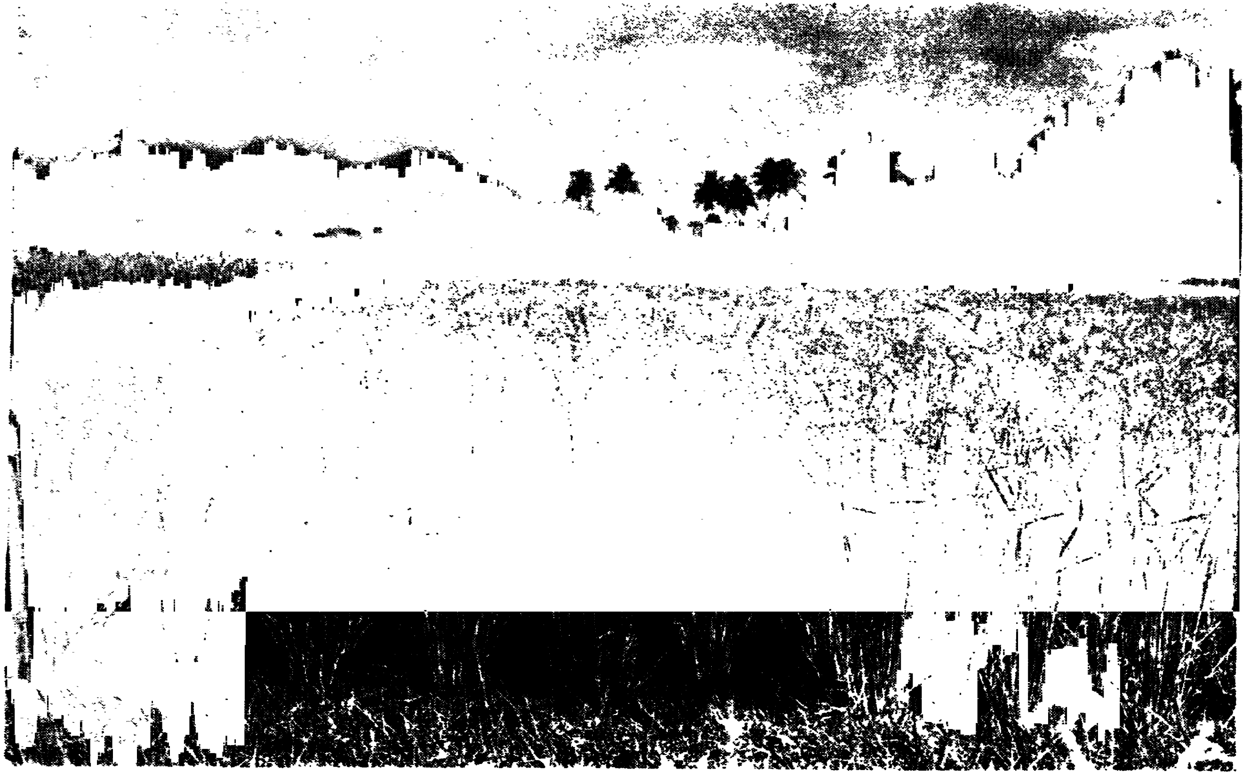
the rainfed, and the wet or swamp cultivation. The rainfed area is comparatively small whereas cultivation under wet conditions is extensive and contributes most to the total production of rice. In parts of the West Coast, and in the agency tracts, rice is cultivated purely under rainfed conditions. There is also a practice prevalent in parts of the Chingleput, Nellore and Kurnool districts where the rice is first sown as a dry crop and treated as a wet crop later. In some districts the practice is prevalent of growing rice as a garden crop with lift irrigation from wells, as in Salem. The chief source of rice supply is from the deltaic tracts where water supply is assured from big irrigation systems on the Godavari, Kistna and Cauvery.

The rice growing seasons synchronise with the two monsoons. Though the majority of the rice area of the Province consists of single crop lands, where a variety of 5 to 6 months duration is grown, in some parts of the Province where water supply is adequate it is usual to grow two or three crops in a year in the same field. Normally rice follows rice year after year, and no rotation is followed. In some districts there is a practice of growing a pulse between two rice crops. Under garden conditions rotation with other crops is common.

[1] The average outturn per acre of paddy under irrigated conditions is 1,631 lb. and 1,153 lb. under rainfed conditions. 'The yield is low, and given ample water and manure it is possible for rice yields to be forced up much higher. Manurial experiments carried out in many places and over many years indicate that rice yields can be increased by anything from 20 to 150 per cent according to the variety of soil, climate and season. [2]Dr. Burns estimates on a conservative basis the possibility of increasing the yield by 30 per cent made up of 20 per cent due to increased manuring, 5 per cent due to improved variety and another 5 per cent by protection from pests and diseases.'

186. In Madras, the first crop taken up for improvement was rice. A Central Paddy Breeding Station was opened at Coimbatore in 1913. Fundamental studies, leading to an understanding of the genetic make up of the rice plant, which is so essential for improving the crop initially, formed the main work. Later on the knowledge of the differential response of rice varieties in different tracts led to the opening of a series of sub-stations in the main rice growing areas of the Province, namely, Pattambi, Mangalore, Maruter, Aduthurai, Pattukottai, Ambasamudram, Tirurkuppam and Buchireddipalem. So far, 124 strains of paddy of durations varying from 90 to 200 days suitable to varying seasonal conditions prevailing in the different tracts of the Province have been released. While all these strains have been selected for higher yield some are also specially marked for certain characteristics

[1] Season and Crop Report, Madras Presidency, 1944–45, page 14.
[2] Dr. Burns, Technological Possibilities of Agricultural Development in India, page 53.



A GOOD CROP OF G.E.B. 24—A HIGH YIELDING PADDY STRAIN COMING UP IN ALL PARTS OF THE PRESIDENCY IN THE EARLY SAMBA SEASON

such as resistance to disease, drought and lodging. They also include some better qualities of rice specially suited to certain markets.

While most of the strains have completely replaced the original local unselected varieties of the tract in which they were being grown, some of them like G.E.B. 24, Co2, Co7, ADT11 being cosmopolitan in nature, have replaced other varieties in the different districts. In the delta areas of Godavari, Kistna and Cauvery and the Central districts of Coimbatore, Salem, Madura and North Arcot the strains have spread over three-fourths of the area. The strains are popular in all the districts of the Province excepting in certain tracts like the West Coast where the spread is poor due to the peculiar condition of village life, cultivation practices, and land tenure. With no organisation to record areas of paddy under different varieties and under improved strains, after a certain stage, it is difficult to keep track of the spread of these varieties. It should have reached nearly 5 million acres by 1944–45. All the strains released have been found to yield 10 to 25 per cent over the unselected local varieties. On the basis of a 10 per cent increase, the accretion to national wealth may be estimated at Rs. 2½ crores annually.

Millets

187. The next largest area in the Province is cropped with millets, the average area during the last decade being 13,179,500 acres. They constitute the poor man's food crop. The total production of cleaned millets in the Province is estimated at 2,983,939 tons.

In the millets group, cholam occupies the largest area. [1] The irrigated and dry cholams occupied together 4,645,257 acres in 1945 of which the dry crop occupies over 4½ million acres. The irrigated area is small and is only 444,832 acres, found largely in Coimbatore, Madura and Tinnevelly. The Ceded Districts have the largest area under the crop, occupying 1,817,484 acres representing 40 per cent of the total area under the crop, in the Province. Bordering these districts Kistna, Guntur and Nellore have also large areas. In the south, the four districts of Coimbatore, Salem, Trichinopoly and Madura constitute another cholam region comprising an area of 1,356,489 acres. The crop being mostly rainfed, the yields are dependent on the vicissitudes of the monsoon. The average yield may be anything from 100 to 700 lb. per acre for the dry crop while the irrigated yields vary between 1,200 and 1,500 lb. The normal production of cholam in the Province is estimated at 1,263,780 tons.

188. The cholam crop is of importance to the Province as providing food for man and beast. Many varieties of cholam are grown entirely for green fodder purposes. Cholam does not grow well where the rainfall is high. A rainfall of 25 to 40 inches suits it. It is grown in areas of lesser rainfall and also in retentive soils by

[1] Season and Crop Report, Madras Presidency, 1944–45.

adopting dry farming methods. The adoption of such conservation methods has a great future in increasing the cholam yield of the Province and already considerable progress has been achieved in this direction in the Ceded Districts.

Next to cholam, cumbu (Italian millet) occupies a large area under millets. The normal area under cumbu in the Province is 2,637,640 acres. The crop is mostly rainfed and its distribution in the Province closely follows that of cholam. The other millets grown are ragi, tenai, samai, panivaragu and several other minor ones and in all they occupy a total area of about 5½ million acres.

Crop improvement in millets was begun in 1922 with the establishment of the Millets Breeding Station at Coimbatore. As millets are mostly rainfed, they are greatly subject to the environments in which they are grown such as soil, sowing time, and wind direction and the number of varieties suitable to the varying conditions are very many.

Since the beginning of the station in 1922, 45 strains have been evolved for cholam, cumbu, ragi, tenai and other minor millets. The strains are popular in the Ceded Districts in the north and in Salem and Coimbatore in the south. The spread in other districts is not extensive due to vagaries of the seasons, as a spread in a particular tract is lost by bad seasons and the process has to start afresh due to loss of seed. It is estimated that the total spread of the millet strains in the districts, up to date is about half a million acres.

Pulses

189. Pulses form another group of complementary food crops occupying on an average 2,837,680 acres. The chief pulses are redgram, blackgram, greengram, bengalgram and horsegram. Their annual production averages around 250,000 tons. The production of pulses is poor in the Province and constitutes only half its requirements, the remaining half being imported. There is need for increased production of pulses.

Pulses supply the protein requirements of the human body. Much attention was not bestowed on them in the early stages; some early work on redgram, bengalgram, and other pulses had been done by the cotton and millets breeding stations, but crop improvement work started only in 1943. Ten strains of the different pulses have been evolved so far and they are in the initial stages of seed multiplication and spread.

Commercial crops

190. The total area under commercial, non-food or money crops fluctuates between seven and a half million and ten million acres depending on the prices of the commodities. The three important commercial crops are groundnut, cotton and tobacco. Out of a total cultivated area of 370 lakhs of acres, food crops occupy 280 lakhs of acres including the condiments, sugarcane, fruits and vegetables and fodder crops. Oil seeds occupy 59 lakhs of acres of

which the share of groundnut and gingelly comes to 49 lakhs of acres. They are also food crops in addition to being commercial crops. Therefore nearly 339 lakhs of acres are under foodcrops and this represents 92 per cent of the area cultivated with crops in the Province. The area under purely commercial crops is comparatively small.

Among commercial crops quality is an important factor. One remarkable feature in modern Indian agriculture is the increase in area under cash crops compared with that of food crops. The area under cotton, groundnut, and tobacco has increased more than the area under food crops as seen from the following statement :—

Year.	Total area under food crops (in thousands of acres).	Area under cash crops (acres in thousands).			Total under non-food crops (acres in thousands).
		Oil seeds.	Fibres.	Drugs.	
(1)	(2)	(3)	(4)	(5)	(6)
1920–21	29,132	3,490	2,277	453	..
1921–22	31,128	3,373	1,942	469	6,405
1922–23	30,631	3,552	2,485	448	7,132
1923–24	28,952	3,585	2,085	455	7,472
1924–25	29,954	3,743	3,069	504	7,969
1925–26	30,024	4,495	3,132	496	8,754
1926–27	29,354	4,468	2,389	476	8,013
1927–28	29,861	5,260	2,273	536	8,697
1928–29	29,516	5,516	2,641	508	9,233
1929–30	30,459	4,988	2,640	510	8,800
1930–31	30,470	5,332	2,210	505	8,723
1931–32	30,375	4,426	2,354	545	7,969
1932–33	30,386	5,423	2,129	539	8,778
1933–34	29,754	5,648	2,327	535	9,176
1934–35	29,761	4,053	2,435	585	7,777
1935–36	28,396	4,191	2,846	569	8,232
1936–37	24,476	5,222	2,646	540	8,394
1937–38	26,623	6,353	2,781	577	10,295
1938–39	27,039	5,568	2,158	603	8,922
1939–40	27,365	5,288	2,420	592	8,916
1940–41	27,826	5,634	2,615	606	9,517
1941–42	28,046	4,380	2,795	630	8,373
1942–43	28,007	5,138	2,459	576	8,733
1943–44	28,928	5,215	2,417	525	8,777
1944–45	27,968	5,906	1,879	617	9,031

Cotton

191. The area under cotton in the Province ranges between 2 and 2½ million acres. The trade classification of Madras cottons is as follows :—

Varieties of cotton.	Normal area[1] (in acres).
Cambodias	523,980
Tinnevelly including karunganni	731,300
Northerns	191, 00
Westerns	837,510
Cocanadas	123,350
Others	54,610
Total ..	2,462,450

[1] Season and Crop Report, Madras Presidency, 1944–45, page 12.

[1] The normal production is 511,000 bales of 400 lb. each.

The earliest attempt made by the Government at crop improvement related to the improvement of the cotton crop. As a result, the area under improved varieties of cotton had extended by 1926–27 to over 3½ million acres all over India as against 2½ million acres under wheat and less than one million acres under rice Cotton improvement has now progressed to the stage of evolving the type or types of cotton that are to be produced in future. The long-term policy regarding cotton improvement formulated by the Indian Central Cotton Committee and the Agricultural Departments working in co-operation with it has been to establish a better balance between short staple and medium staple cottons. Considerable progress has been made in this direction. The production of medium and long staple cotton in India has gone up from a quarter million to nearly two and three quarter million bales, i.e., by nearly one and a half million bales in two decades. By 1939, except for a shortage of cotton above 1-16", India was in sight of a reasonably balanced production of short and long staples.

192. How far modern methods of plant breeding by hybridization and selection can help crop improvement is well exemplified in the evolution of the Cambodia cotton strains at the cotton breeding station at Coimbatore. Patient research in the face of heavy odds and often negative results extended over two decades has led to the production of Co3, Co4 and 4463 whose better samples are considered equivalent to the East African styles like Merzana. Co3 and Co4 are long staple quality strains, having a staple length of 1-1/16" and an yield of 25 per cent more than the Co2 originally introduced by the department. Since its introduction in the Salem district, the bad reputation previously attached to Salem cotton is a thing of the past and the ryots are realizing better incomes. Co4 is chiefly grown as a summer crop in the districts of Ramnad, Tinnevelly, Madura and South Arcot and is in great demand by mills spinning finer counts. On account of its early maturity considerable irrigation charges are saved. The variety is also popular in the Irwin canal area in Mysore. The popularity of the Cambodia strains is seen from the fact that almost the whole area under this cotton in the Province is now covered by departmental strains. The increased income to the ryot by better yields and better quality is estimated annually at over Rs. 75 lakhs.

Other strains of cotton evolved are for the dry cotton areas of Tinnevellies and the Westerns. K.I. for the Tinnevellies, and H.I. for the Westerns are the popular strains and together they occupy over 7 lakhs of acres. K.I. has replaced large areas of the original Tinnevellies in the south and is much sought after on account of its earliness and higher yield than the local type. It is chiefly concentrated in the rainfed regions of Coimbatore.

Season and Crop Report, Madras Presidency, 1944–45, page 17.

Madura, Ramnad and Tinnevelly districts. H.I. strain is popular in the Ceded Districts.

Oil seeds

193. The next important commercial crop is groundnut. The earliest attempt to improve the groundnut crop was made in 1903 when the Madras Chamber of Commerce complained about the deterioration of the groundnut crop in the Province. Foreign seeds of groundnut were imported and distributed through Collectors to selected cultivators. A separate section for the improvement of oil seeds was started in the year 1930 and work was chiefly concentrated on groundnuts, gingelly, coconuts and castor which form the most important of the oil-seed crops of the Province. As a result of intensive breeding and selection work three improved strains have been evolved for groundnut which give, on an average, an outturn of over 25 per cent over the local Mauritious variety. Some of these strains especially AH 25, is also resistant to " tikka " or leaf spot disease. The groundnut strains have not spread like paddy and cotton as the rate of multiplication is comparatively low, being only about eight times the seed rate. The present spread is limited to about 3 lakhs of acres.

Sugarcane

194. Work on the improvement of the sugarcane crop has been done at the sugarcane breeding station at Coimbatore. The breeding of sugarcane for Indian conditions was begun by the late Dr. Barbar at Coimbatore in 1913 and was carried on by Sir T. S. Venkataraman till recently. From Coimbatore there has poured out a stream of new varieties, the so-called Cocanes, from which suitable types have now been found for every area in India. Over 90 per cent of the total area under sugarcane in the Madras Province is now covered by improved varieties. Wherever these varieties are grown the yields have been in many cases doubled.

Tobacco

195. With nearly 3 lakhs of acres under tobacco, Madras has largest area among the Provinces, next only to Bengal. Modern development in tobacco growing is in the cultivation of cigarette tobacco in the Guntur district. [1] The stimulus to the production of this leaf is to some extent due to the activities of the Indian Leaf Tobacco Development Company, a subsidiary of the Imperial Tobacco Company of India. India is actually, the largest tobacco producer of the world, the production exceeding 1,500 million lb., which is just a little less than one-fourth of the world's production. Development work in tobacco is mainly directed towards increasing the yield and quality of the leaf and in the introduction of new varieties.

[1] **Technological** Possibilities of Agricultural **Development in India** by **Dr. Burns, page 97.**

Future plans of crop improvement

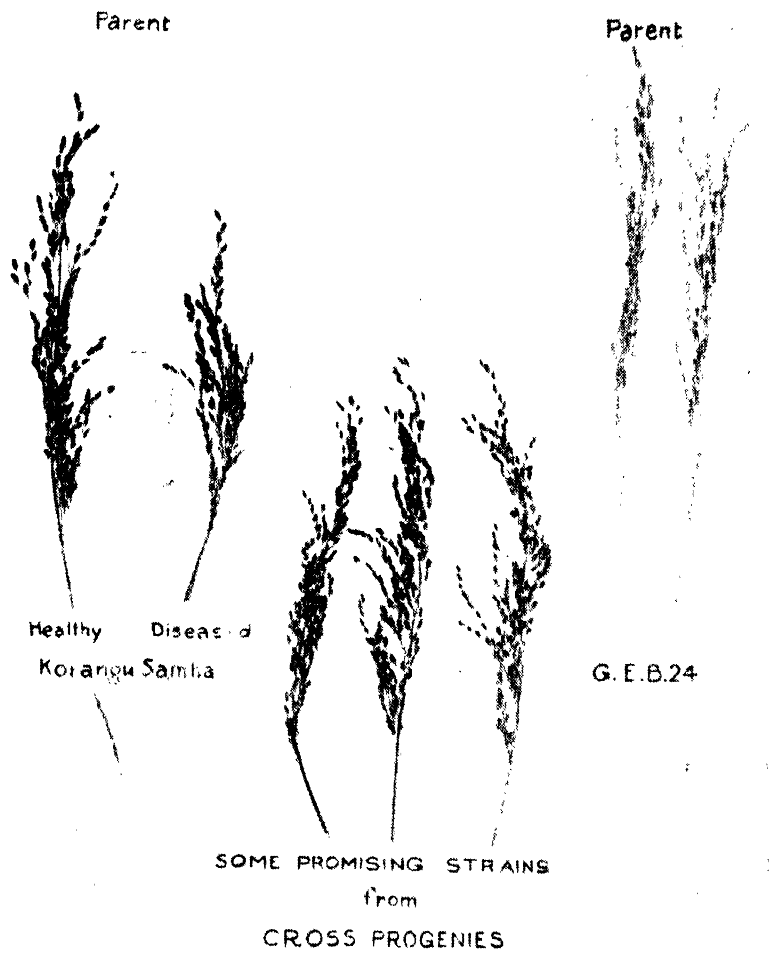
196. The improvement of crops in future will necessarily continue on the same lines as before in the unremitting search for better and high yielding strains. The work in this direction is never complete. The major problem in all plant breeding stations is the maintenance of the evolved strains at their high standards of productivity with an ever watchful eye against deterioration. As a strain goes on multiplying deterioration results and this has to be watched and rectified by verification. Simultaneously new strains have to be evolved which may have better yield potentialities and as these are released they in turn replace the old ones.

In this work, new problems keep coming up; as for instance breeding of a variety suitable to a particular tract or soil or the isolation of a strain resistant to a particular disease. Taking the case of the rice crop, attention has so far been given to the improvement of varieties cultivated under irrigated conditions. The improvement of varieties under rainfed conditions remains to be taken up. A beginning has been made for Chingleput at the Rice Research Station at Tirurkuppam. Varieties of rainfed paddies for the upland areas of Godavari, Kistna and Vizagapatam are being planned.

Again in the drive to bring more areas under cultivation peculiar problems crop up. These include alkaline and deep water areas and areas of saline infection near the coast. The rice breeder has to evolve suitable types for these conditions by hybridization.

In recent years there is a growing feeling among the general public and the rice trade that the number of varieties grown in this Province are too many for effective storage and marketing. However with the newer knowledge of the science of hybridization and the possibilities of synthesising desirable characters, it may be possible to reduce the number of varieties. Research in this direction has already commenced.

In the future plan of agricultural development one of the most important methods of reaching production targets is by the manuring of crops with artificial fertilisers like ammonium sulphate, and super phosphate. Their use introduces a new environment in the plant and may make them more susceptible to pests and diseases. The demand for pest and disease resistant strains will thus arise soon. The plant breeder has to be alive to the prospective needs of the country and prepare suitable strains by hybridization with disease resistant strains. The application of the modern concepts of genetics and cytology to plant breeding affords vast opportunities to the plant breeder to evolve types resistant to drought and disease and suitable to many other conditions, by interspecific crosses or by inducing mutants with X-ray, chemical treatment or vernalisation.



SOME PROMISING STRAINS FROM CROSS PROGENIES TO OBTAIN PYRICULARIA RESISTANT STRAIN

Seed multiplication and supply

197. The work of the plant breeder in evolving improved varieties of crops is only a means to an end and its value depends entirely on the efficiency of the link with the cultivator for whose benefit the improved variety is evolved. Side by side with the evolution of improved strains by selection or hybridization, the need arises for an organisation to multiply and distribute the seeds of the evolved strain to the cultivator and to watch the continued purity of the strain in the ryots' field year after year and to replace or renew the seed if any admixture or deterioration occurs. This work of seed multiplication and distribution is carried out by several agencies under the close supervision of the technical staff of the department of agriculture and forms one of their major functions.

[1] In England, Europe or the United States the distribution of new varieties of proved value is the work of private agencies. After the preliminary tests with regard to the efficiency of a strain are over, the State takes no active part in it. In India such organised seedsmen do not exist at present and necessarily the State has to look after all the functions of a modern seedsman as understood in advanced countries. Should seed merchants of proved integrity and enterprise be forthcoming, they should be encouraged by the Agricultural Department.

Organization of seed supply

198. For the supply of pure seeds, there are two types of organisations, namely, seed farms run by the Agricultural Department and seed farms run by Co-operative Sale Societies. Maintenance of purity of the strain starts from the Agricultural Research Station. The seeds from the station which are guaranteed for purity and good germination capacity are issued by the department to enthusiastic ryots who agree to raise them under the supervision of the departmental staff. These seed farm ryots are given a small cash advance to meet the preliminary cultivation expenses. The crop is grown under the direct supervision of the technical staff at all stages, and all off-types are removed. The seeds are purchased from the seed farm ryots by paying a premium over the market rate. The advances given are deducted at the time of payment for the seeds. These seeds are distributed to several centres and sold to farmers at sowing time through the agricultural depots in the various taluks. For this purpose the Director of Agriculture has been provided with a permanent advance of Rs. 28 lakhs. A special staff is provided wherever necessary for the supervision of the different operations at various stages from the time of sowing till the final distribution of seed to prevent admixture and maintain purity and quality. With the inauguration of the "Grow More Food Campaign" the supply

[1] Royal Commission on Agriculture in India, 1928, page 102.

of improved seeds has assumed considerable importance. Schemes for the multiplication and supply of improved strains of paddy are now functioning in several districts, viz., Tanjore, East Godavari, West Godavari, Kistna, South Arcot, Vizagapatam, Guntur, Chingleput and Chittoor, and cover over eight million acres. Similar schemes for millets have also been introduced and cover about a million acres. [1] Government subsidy for all these schemes during 1945–46 total 2½ lakhs of rupees, part of which is met by the Government of India.

For cambodia cotton, seed multiplication schemes are worked on an organised and extensive scale. The Tiruppur Co-operative Sales Society runs seed farms employing its own supervisory staff, advancing money to the growers and arranging for the ginning of the kapas and the sale and distribution of the seed. Whenever required, the services of the agricultural staff are lent to the society. The Central Cotton Committee also gives financial assistance for the running of special seed multiplication programmes in some districts like Salem, Tinnevelly, Ramnad and the Ceded Districts.

Improved seeds distributed during 1945 of the most important crops in the Province by the Agricultural Department or its agencies were sufficient for sowing :—

5,200,000 acres under paddy.
211,656 acres under cholam.
828,698 acres under cotton.
385,000 acres under groundnut.

Crops diseases and Pests

199. Control of pests and plant diseases is an important aspect of scientific agriculture. Insect pests and plant diseases cause serious loss to agriculture. It is difficult to assess the loss to crops in this Province as a result of the damage done by pests and diseases. The pests or diseases do not occur with the same intensity and virulence every year. In some years whole crops may be destroyed, in others the damage may be light. From past experience it is estimated that the total loss due to insect pests and diseases on cultivated crops and stored produce will be around Rs. 30 crores every year.

Insect pests

200. Many pests and diseases affect the cereal crops of the Province, which occupy the largest area among cultivated crops. The swarming caterpillar (*Spodoptera mauritea*) is a serious pest of paddy and occurs suddenly and eats away the entire crop in a short time. The caterpillars march from field to field in a swarm and hence the name "swarming caterpillar." Flooding infected fields and isolation of non-infected fields by trenching are effective control methods. The paddy stem-borer (*Schoenobias incertellus*) and the grasshopper do partial damage in certain seasons.

[1] Grow More Food Pamphlet, 1945, page 17.

COCONUT

THE HYBRID OF THE TALL (♀) *v.* DWARF (♂) CROSS

It combines the early-bearing nature of the Dwarf variety and the desirable nut and copra characters of the Tall variety. Note the hybrid vigour in the plant

The rice bug (*Leptocorisa varicornis*) causes considerable damage by sucking the juice from the earheads. A similar bug 'Calocoris' affects the cholam earheads. Hand-netting with bags has been found to be effective in controlling this pest.

The important pests of cotton are the bollworms (*Platyedra gossypiella*) and the stem-borer "pempheres." The larvæ of the latter weevil burrow into the stem in a spiral manner killing young plants and causing old ones to lodge. As the insects breed continuously if the cotton crop is allowed to stand indefinitely for the second picking, the Madras Agricultural Pests and Diseases Act, 1919, has been enforced in many districts in order to create a dead peiiod and starve out the pests.

Cane-borers and termites do a great deal of havoc to the sugarcane crops. The borer bores into the shoots and stems. The yield and purity of the cane juice is affected. Selection of setts at planting time and the application of the general principles of field sanitation have been successful to some extent in controlling these pests.

The Mango-hopper and the fruit-sucking moth are the major pests of the fruit trees. In the flowering season of the mango, the hoppers suck the plant and sap from the flowers resulting in improper setting of fruits. Spraying with fishoil rosin soap at flowering time effectively controls the pest. The fruit-sucking moth punctures the fruits. The damage is very severe in cities. Spraying the fruits with a repellant acts as a check.

The coconut caterpillar and the coconut beetle affect the coconut trees. The former is a serious pest in many of the coconut-growing areas. The control method is interesting as applying the results of modern biological studies. This method proceeds on the principle that there is a balance in nature by which there is natural destruction which maintains a balance in the population. Banking on the fact that there are insect enemies to insects, the Entomologist as it were "sets a thief to catch a thief." The parasites that destroy this pest are multiplied in special laboratories and are released in the infested areas. In severe cases of attack infested fronds are cut and burnt to prevent further infestation.

The pests that attack the groundnut crop are the hairy caterpillars (*Amsacta*) and the "sural puchi" (*Stomopterix nerteria*). Both are major pests causing total destruction in some years. In South Arcot the method of hand picking of the moths was found to be cheap and economical. There are many pests affecting other crops like vegetables, pulses and tobacco. They have been investigated and control measures devised.

There are a large number of insects destroying the produce stored in the godowns and other storage places of the ryots. They affect paddy, rice, wheat, cholam and pulses. The rice weevil is the most dangerous and is capable of causing considerable damage. Drying the grain and storing in insect-proof dry cellers

is a preventive measure adopted. The attacked material can be fumigated with poisonous gases like carbon-di-sulphide or calcium cyanide and the insect killed.

Plant diseases

201. Among the plant diseases, the bud-rot disease of palms caused by a fungus known as *Phytophthora palmivora* was the first to be investigated in 1906. The disease was responsible for the loss of a large number of trees in the Godavari and Kistna deltas and the rapidity with which it spread from one area to another called for drastic measures. The application of the Madras Agricultural Pests and Diseases Act in the Godavari, Kistna and Malabar districts has resulted in checking the progress of the disease. A similar disease of coconuts has also been checked by adopting suitable remedial measures.

The " Mahali " or Koleroga disease of arecanuts was found to cause severe damage to the crop in the West Coast. The disease causes the young fruits to rot on the bunches and drop down. Spraying with Bourdeaux mixture effectively checks the disease. Considerable work has been done on two important diseases of paddy, the blast and foot-rot. These diseases are responsible for a good deal of damage to the crop in this Province in the Cauvery and Godavari deltas. The blast disease is caused by a fungus, *Piricularia oryzæ*, and is difficult to control by the ordinary fungicidal methods. Attempts were made to evolve disease-resistant varieties and strains. G.E.B. 24, CO 1 and CO 4 have been found to be relatively resistant. For rot, a close study of the disease has indicated that the best method of control is the treatment of the seed before sowing with a fungicide known as " ceresan " which is a compound of mercury. The infective spores adhering to the seed are thereby killed and the crop is saved from the disease.

The major diseases of cane for which measures have been popularized are the red rot, sugarcane mosaic and smut. The red rot is the most serious. The selection of disease-free setts during the time of introduction of new varieties has considerably reduced the incidence of this disease. Except in isolated instances, the disease has been kept under complete control. In the case of the mosaic disease of cane, the loss due to it is not as apparent to the cultivator as in the case of red rot, but in the course of years the yield is considerably reduced, once the cane is infected. The disease is characterized by a peculiar mottling of the leaves. It is kept in check by growing disease-resistant varieties, by careful selection of setts and roguing diseased plants from the field.

The smut of cholam and tenai is another disease which can be controlled by preventive measures. The disease is caused by fungal spores adhering to the seed and grows with the plant. Mixing the seed with sulphur powder before sowing kills the spores and the disease is avoided. Thousands of acres in the Province are now

CONTROL OF FRUIT ROT AND LEAF DROP OF ORANGES BY SPRAYING 1% BORDEAUX MIXTURE

Unsprayed trees

D

CONTROL OF FRUIT ROT AND LEAF DROP OF ORANGES BY SPRAYING 1% BORDEAUX MIXTURE

Sprayed trees

sown with sulphur-treated seeds and the loss is considerably reduced.

202. There are two Acts relating to crop pests and plant diseases :—

(1) The Destructive Insects and Pests Act, 1914, is a kind of quarantine measure intended to prevent the introduction into British India of any insect, fungus or other pest which is or may be destructive to crops. The work of inspection and fumigation of plants imported by sea into the Madras Province at the ports of Madras, Tuticorin, Dhanushkodi, Negapatam, Vizagapatam and Cochin is undertaken by the Agricultural Department. In respect of plants imported at the other ports, the work is attended to by the Customs authorities concerned.

(2) The Madras Agricultural Pests and Diseases Act, 1919, provides for the prevention of the spread of insect pests, plant diseases and noxious weeds which are injurious to health or to crops, plants, trees or water-supply or obstruct waterways within the Province of Madras. Whenever it is notified that any pest, disease or weed in any area is dangerous to health or is injurious to crops and plants, and that it is necessary to take measures to eradicate it or to prevent its introduction or reappearance, the fact is proclaimed by beat of tom-tom and by posting copies of the notification in the village chavadi or other prominent place. After the issue of the notification, every occupier within the notified area is bound to carry out the remedial and preventive measures prescribed in such notification. Leaflets have been prepared by the Agricultural Department in simple language giving a clear description of the pests as well as the treatment to be adopted and the reasons for adopting it. These leaflets are published in the languages of the district in the village sheet of the District Gazette. Copies of the leaflets are also distributed to agricultural associations and the chief landowners in the tracts and posted in the village chavadis and other prominent places. The inspecting officers appointed by the Government may enter on any land or water within the notified area and take such action as may be necessary in order to ascertain whether any insect, pest, plant disease or noxious weed is present and whether the prescribed remedial or preventive measures have been taken. If any occupier fails to remove such notified plant before the date specified in the notification, the removal or destruction of such plant may be carried out by the inspecting officer and the cost recovered from the occupier as an arrear of land revenue. If in carrying out any remedial or preventive measures, the inspecting officer destroys any trees or plants as stated in section 9 (1) of the Act, he shall serve a notice in writing on the occupier stating particulars of the trees and plants destroyed and his estimate of the value, and the occupier shall be entitled to compensation as prescribed in section 9 (2) of the Act. No compensation shall be payable for any noxious weed destroyed or for cotton plants the destruction of which has

been prescribed in order to eradicate or prevent the introduction or reappearance of any insect pest. Though there was some opposition to the Act in the beginning, the ryots have now sufficiently realized the advantages of carrying out the control measures and the Act is now being worked smoothly.

Agricultural Research, Propaganda and Demonstration

203. While the primary purpose of research work is the acquisition of exact knowledge, the ultimate purpose is the translation of this information into concrete improvements which the cultivator can adopt as part of his ordinary farming practice and this dual aspect of research work in the laboratory and demonstration and propaganda in the field may be said to form the main functions of the Agricultural Department. The chief centre of research is the Research Institute at Coimbatore equipped with a staff of specialists. Here, plant breeders endeavour to evolve new strains in paddy, cotton, millets, oil seeds and other crops; pathological problems affecting crops are investigated by the Entomologist and the Mycologist; the Chemist is engaged in matters dealing with the nutrition of plants and animals or with conservation of moisture; the Research Engineer is concerned with the improvement of the various indigenous implements, bearing in mind the needs and limitations of the ryot. In intimate association with these officers are those in the districts, the Deputy Directors of Agriculture and District Agricultural Officers who in their Agricultural Research Stations have twofold functions to perform, viz., putting to test on a field scale the improvements made at Coimbatore in places which are dissimilar in soil and climate and investigating the various local problems in farming practices which await solution. There are 32 Agricultural Research Stations in the Province, some of them for studying general farming problems and some, for specialization in fruits, coconuts, pepper and potatoes and such other special lines.

204. The chemistry section is the most important of the sections at the Agricultural Research Institute. Its routine work is mainly analytical. For a nominal sum ryots can have their soils and manures analysed and obtain valuable advice. Research is, however, the predominant activity in the section. For a quarter of a century experimental work with indigenous manures and artificial fertilisers has been carried out by the section.

Soil survey is another important contribution of this section. Rain and rainwater continue to be the final arbiters in the destinies of millions of poor cultivators of dry lands. Such lands are cheap and are the only ones the poor own. The nature of soil physics that operates in holding the moisture that is available in the soil after the precipitation, through judicious cultural and other treatments, presents a problem of the first magnitude. A soil specialist is wholly devoted to this important problem of physical chemistry. He is at present stationed at Hagari in the

ALKALINE LANDS

ALKALINE LANDS—RECLAIMED

Bellary district and is closely collaborating in the Dry Farming Scheme.

To know the chemical composition of the soil and its physical properties is not enough. Every animal and plant owes its existence to the fertility of the soil, and this in turn depends on the activity of the bacteria which inhabit the soil in inconceivable numbers. We are familiar with bacteria and the first association that comes to mind when we think of these organisms is the havoc they play on human life. How they permeate the whole of our existence in the air, in water and in the soil and in our food is a matter which is not easily recognized, till we are up against some malefic aspect of their presence. That they can be beneficial is obvious to anyone familiar with the health-giving bacteria in butter-milk. A study of these bacteria in their manifold relation to agriculture is thus of paramount importance and an Agricultural Bacteriologist is devoting his attention to this subject.

205. The intensive study of human nutrition is receiving the attention of other institutions interested in public health and is financed from the funds available for the purpose. The problem of animal nutrition is of great importance, especially when we realize the necessity of conducting researches under Indian conditions with Indian animals. It has been found that a blind application of western standards is uneconomic. In an agricultural country where the human population is itself in need of a full supply of food it is wasteful to feed animals without a knowledge of their requirements. The modern tendency in animal husbandry is to advocate the keeping of fewer animals and a more rational feed for them. From this point of view the addition of a wing devoted solely to animal nutrition is a development of much potentiality.

Of the disturbances that a cultivator experiences in the pursuit of his avocation nothing is so chilling as his impact with insect pests and fungoid diseases. These have to be controlled and their spread checked. This can be done only with a knowledge of their life history and their relationship to their host plants. The sections of mycology and entomology deal with these pests.

The mycological section handles fungus diseases which are of vegetable origin. The first essential in investigating such diseases is to grow the fungus on a suitable medium in order to ascertain how it lives and spreads and also to be able to identify it by the spores which it forms. In many cases, such a fungus has a definite resting state by which the disease is carried over from one plant to the next and the infection is continued. It is also necessary to ascertain which particular part of the plant is attacked and how the fungus gains entrance into its host. All these mean detailed microscopic work in the laboratory. The next step in dealing with the disease is to try different methods for keeping it in check or for destroying it.

The entomological section deals with insect pests. Of the most recent advances in the control of these pests is the biological

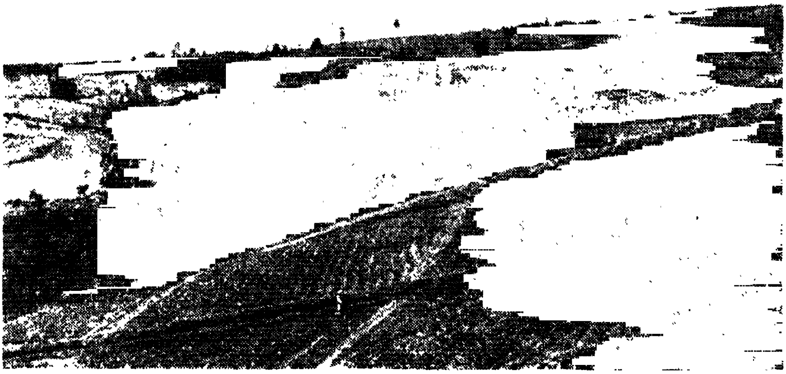
method of control, already referred to. The control of the insect pest on the wattle in the Nilgiris and the check to the coconut leaf caterpillar in the West Coast are notable achievements in this line. The entomologist not only fights against destructive insects but also harnesses useful insects to the service of the cultivator. Thus in apiculture and sericulture much practical experience has been gained and made available to the cultivator.

206. Another notable advance is the decentralization of relief measures in the control of insect pests and fungoid diseases. Formerly, assistance used to be sent from Coimbatore on receipt of intimation from cultivators in distress. This was often dilatory and ineffective. Assistants trained in plant pathology are now at the service of the cultivator and ready to respond to his call in all the districts of the Province.

The need for specialization in crops has been receiving increasing attention. In India cotton was the first crop to be studied intensively. Wheat, sugarcane and rice came next. The starting of work on millets has coincided appropriately enough with the recognition that protective irrigation for millets serves a larger area than intensive irrigation of paddy. Starting with millets, specialization was undertaken on oil seeds including coconuts, on sugarcane for Madras conditions, on fruits, potatoes and bananas. In respect of rice, regional activities intensified with the opening of sub-stations at Aduthurai in the Tanjore district, Maruteru in the West Godavari district and Pattambi in Malabar. Assistants trained in cotton and millets reinforced the staff at the Agricultural Research Stations, Hagari, Nandyal, Guntur and Koilpatti.

207. Agriculture is dependent on implements and some element of engineering is involved in nearly every agricultural operation. The ploughing, pulverising and levelling of the soil, the cleaning and grading of seed and its drilling, the irrigating, inter-cultivating and weeding, the harvesting, thrashing and hauling of the crop to the markets are all operations to which the skill of the engineer may be applied to enhance efficiency. The need for research into this specialized branch of engineering is, therefore, of paramount importance. It is obvious that manual labour alone can never cope with agronomic needs. The more efficient his mechanical equipment the better is the return. The Agricultural Research Engineer appointed to the staff of the Agricultural department in 1928 tackles all these problems.

The introduction of hydro-electric schemes and the consequent availability of cheap power brings into prominence the role of electricity in agricultural development. For agricultural purposes power is supplied at a low rate. At the Central Farm, Coimbatore, valuable experience and data are being obtained in the use of electricity for agricultural purposes. There is scope to utilize this power on a wider scale in practically every field of agronomic activity.



STRIP CROPPING

RESULTS OF SOME CULTURAL PRACTICES

Bunch planting *v.* Economic planting

Demonstration

208. Research discovers improvements in the local methods of agriculture. When this has been done, and after the suggested improvements have been thoroughly tested out in the experimental stations and found to be applicable to local conditions, the next step is to teach the improvements to the ryots. This is done by the district staff of demonstrators under the supervision of the District Agricultural Officers. They educate the ryots in the new methods and persuade them to adopt them. The ryot, like farmers all the world over, is cautious and quite rightly wants to be convinced of the reliability of anything new before he adopts it. The experimental stations by themselves do not impress him. In the first place, they are experimental stations and not demonstration farms, and in the second place, the ryot is very apt to think that he cannot hope to do on his land what the Government can do in their stations with ample facilities by way of staff and money behind them. Most of the ryots are illiterate and leaflets are of no use to them. It is necessary, therefore, to go actually to the ryot and show him, and not wait for him to come and be told. To this end agricultural exhibitions are held on all important occasions and festivals at which the countryfolk congregate.

Trial plots

209. Conditions in a research station are of necessity different from those prevailing in the ryot's holding. It is, therefore, necessary to determine whether the same result can be obtained in the ryot's holding as in the research station or whether the result will be modified. This information can be obtained only by repeating the experiment in the ryot's holding but carrying it out with the same care. Plots in which such experiments are carried out in the ryot's land are called " Trial Plots."

Demonstration plots

210. The precise purpose of the demonstration plot is to demonstrate a proved fact and not to elicit the fact which is the function of the experimental plot in the research station and the trial plot in the district to which reference has already been made. It is, therefore, not necessary to give the same meticulous care to these plots as to the trial plots nor is it necessary always to record the yields; but it is necessary to see that the demonstration has a fair chance of success and that the cultivator is really interested and does most of the work himself. There are thousands of these plots in the Province and they deal with a large number of agricultural improvements, beginning with quite simple ones which need no extra expenditure on the part of the ryot, like thinly sown nurseries and economic planting of paddy, leading up to more elaborate ones where artificial manures are used. A general policy is adopted of beginning with simple improvements and after the

ryots have seen that these are really effective and their confidence gained, of leading them on step by step till all that has to be taught is demonstrated. There is a long list of improvements that require demonstration, such as the use of iron ploughs and better methods of cultivation, the use of better mhote buckets and wheels, the use of green manure instead of depending on the forest for leaf, better methods of making and storing cattle manure, and use of better strains of seed and the like. In the cotton areas, demonstrations deal with new strains of seed which give bigger yields and better quality of lint, drill sowing and inter-cultivating with bullock power, better methods of irrigation which conserve water, clean methods of picking, and finally co-operative ginning and marketing. In the sugarcane areas, deep cultivation, line planting, propping and wrapping, manuring and the use of iron mills and Sindewahe furnaces are demonstrated. In a large number of cases, enough monetary gains have been obtained so that the ryots can see just how much they can benefit from the improvements which are advocated.

Conclusions

211. The description of the research, demonstration and propaganda work done by the Department of Agriculture and of the results achieved in respect of the various crops should not be understood as an indiscriminate panegyric of the department. The public see the poverty of the ryots and the poor crops in the fields and are apt to feel that no useful work of improvement is being attempted. It is merely intended, therefore, that the nature of the work being done should be made known in the background of the general problems of rural development. This is not to say that one is not sensible of the vast range of the work yet to be done in every sphere; but a knowledge of facts helps to build up informed and constructive criticism. It is also true that knowledge of a problem or even means to solve it are by themselves only a meagre first step. The application of the results in the field raises important issues that are outside the purview of research and even demonstration, like the adequacy of the staff, the willingness of the ryot, and what is more, his financial ability to carry out the improvements. Technological improvements, therefore, are vital but not, by their nature, sufficient. The work described in this chapter has to be appreciated within these limitations.

USE OF BULLOCK POWER FOR INTER-CULTIVATING CAMBODIA COTTON

CHAPTER VI—TARGET FOR AGRICULTURAL PRODUCTION

212. The aim of increasing agricultural production in this Province should be related first to an objective and second to a target. The objective may be briefly described to be the creation of self-sufficiency by reference to reasonable standards. Self-sufficiency has both a quantitative and a qualitative aspect. In an adequate dietary the quantity of food has to be distributed amongst certain accepted varieties so as to provide the necessary nutrition. The target will follow from an assessment of the needs of the population. The target has then to be phased over a period. This period has to be reasonably long to enable the measures proposed to bear fruit, but not so long that it is projected into a distant and unpredictable future.

213. In this chapter it is attempted to estimate the food deficiency of the Province. This study is first confined to deficiency in the quantitative sense. The deficiency is then estimated by reference to accepted minimum standards of nutrition. Measures for increased crop production are then discussed in relation to possible increases likely to result from each measure.

The correctness of the estimates of present production and probable requirements depends upon the adequacy as well as the accuracy of the statistical data available. The shortage experienced during the war has led to numerous calculations in this matter, but these calculations cannot be wholly accepted for an estimate of post-war food requirements. In the first place, war-time calculations of civil needs suffer from the inherent defect that the main objective is not so much to find supplies sufficient for normal requirements as to curtail normal requirements to the level of available supplies. Secondly, in estimating the normal requirements, the method usually adopted is to add up the local production and the average net imports. The resulting figure is, strictly speaking, the quantity available for consumption which is not the same as the quantity required for consumption. What is required depends on the physical needs of a healthy individual whereas what is available is based on other factors.

An attempt is made in the succeeding paragraphs to examine the needs and requirements of food crops by reference to normal long-term conditions. All the figures are not for the same years, but figures of production and trade and are taken for the years just preceding war conditions.

Production and consumption of rice and millets

214. Appendix 13 gives the normal areas under food and non-food crops in the several districts of the Province. Food crops

occupy more than 90 per cent of the cultivated area in three districts, between 80 per cent and 90 per cent in six districts, between 70 and 80 per cent in eight districts, between 60 and 70 in six districts and less than 50 per cent in only one district (the Nilgiris).

Among food crops, rice occupies the first place as the chief staple food of the population. Rice, however, is not the only staple food and a good portion of the population depends on millets (cholam, cumbu and ragi) as the chief article of diet. The approximate percentage of the population in each district depending on rice and millets respectively is given in Appendix 11. The Ceded Districts and the districts of Guntur, Nellore, Chittoor, Salem, Coimbatore and Trichinopoly are the chief millet-eating areas though the commodity is consumed by a comparatively lesser proportion of the population in other districts as well. As millets are used as a substitute for and not as a supplement to rice in the dietary, the needs of the one will depend to a large extent on the availability of the other, so that it is desirable, in considering the food crops of the Province, to examine the position of rice and millets, together.

Method adopted for estimating deficiency

215. The position of millets is somewhat peculiar. Figures of production and net imports of jowar and bajra for the eight years ending 1942–43 indicate that as against the normal production of about 2 million tons of these millets, the average net import is only of the order of 16,000 tons which represent only 0·8 per cent of the local production (*see* Appendix 18). There is no export or import of millets on any scale comparable with local production. This is true not merely for the Province as a whole but for each district within the Province itself, as it is understood that there is not even inter-district movement of millets on any scale worth notice. This indicates that neither the Madras Province as a whole nor any district in it has any surplus of millets to export. This does not, however, indicate that the Province is self-sufficient in millets, but only that there is no exportable surplus of millets, a distinction of considerable importance in view of the difficulty of defining self-sufficiency for crops that are largely substitutes for rice and in respect of which, therefore, an independent demand is difficult to estimate. The percentage of the population in each district depending on millets as gathered from the Statistical Atlas of this Presidency is given in Appendix 11, but it is not known how far it represents the correct position and whether the percentages would not have altered since, having regard to the slow change over from millets to rice which is said to be taking place. In view of this uncertainty, the method adopted is to determine what part of the population can subsist on the millets now available and to assume that the rest for whom millets are not available eat rice; and the deficiency of the Province in the matter of

food-grains is thus calculated in terms of rice in the ensuing calculations of requirements and deficiency. In planning for self-sufficiency, however, the feasibility of meeting the net deficit of rice by increased production partly of rice and partly of millets in such proportion as may be found desirable can be considered.

The method of calculating the present deficiency is thus briefly to estimate the present production of millets; to find out what part of the population can subsist on the millet produced, at a rate of per capita needs which should properly be applied to each district; to deduce the balance of population that have to depend on rice; and then to work out the rice requirements of that population at a reasonable rate of per capita consumption. The resulting figure of total needs when compared with the figure of estimated local production of rice will indicate the rice deficiency which has to be made up to reach self-sufficiency by increased production of rice as well as other food crops.

Increase in population and the value to be given to it

216. A word is necessary at this stage about the population figure that has to be adopted. Appendix 16 gives the district-war population of this Province according to the census of 1931 and 1941. Taking account of the rate of growth of population as revealed by the two sets of figures the probable population in 1944 and 1945 is also worked out and given in columns 5 and 6 of the same appendix (1944 is taken as the year before the development of production crisis). The estimated population of 1944 is 50,990,000. This figure includes persons of all ages. The per capita consumption depends on the age of the person. Infants do not consume cereals at all and children between certain ages do not consume as much as adults. Again, persons beyond a certain age-limit may not consume as much as an ordinary adult. It is, therefore, necessary to adopt different rates of consumption for different age groups. For the sake of convenience, it is desirable to calculate the adult equivalent of the total population so that a uniform rate of per capita consumption may be applied in determining the requirements. Having regard to the different consumption capacity of the different age groups Sri C. R. Srinivasan in his report on " Rice Production and Trade in the Madras Presidency " has found that the population in terms of adults is equivalent to 75 per cent of the total population.[1] On this basis, the popuation in 1944 in terms of adults will be 75 per cent of 50,990,000 or 38,243,000. Food has to be found for this population.

The question arises further whether, for purposes of post-war development, a further increase in population with reference to

[1] Report of the Rice Production and Trade in the Madras Presidency by C. R. Srinivasan, page 14.

the trend of previous figures should not also be taken into account. There are, however, practical difficulties in making such an attempt. Over a long period, it cannot be asserted that the existing rate of increase will be kept up, as it may not be possible to foresee conditions which may come to exist at some indefinite date in the future. Over a short period the changes are not likely to be considerable enough to make the effort worthwhile. The fixing of a period in the future will give rise to further controversy. For the present it will suffice to provide for the full requirements of the existing population, leaving further development to the demands of increased pressure if and when it begins to manifest itself.

Per capita requirements of rice and millets

217. Regarding the calculations of actual requirements, the per capita needs of an adult in respect of millets and rice have to be ascertained. So far as could be gathered, the per capita needs as now worked out for statistical purposes is an arithmetical figure obtained by dividing the total consumption (production *plus* net imports) by the population. The criticisms against equating actual needs to actual consumption have already been adverted to. The percentage of underfed population in the Province is by no means negligible, and any figure of requirements produced on the basis of actual consumption by such underfed strata will be a gross underestimate. The difficulties in proposing a figure representing the proper per capita needs were expressed by Sri C. R. Srinivasan in the following words in his report on "Rice Production and Trade in the Madras Presidency":—

[1] "At the Crop Planning Conference recently held at Simla mention was made that an adult took 1·25 lb. of rice per day in Madras some ten years ago and that there has been a growing tendency for more people to take to rice diet. Col. McCarrison mentions the quantity of polished rice taken per day per head of the population as 21 oz., for a poor Hindu family and 23 oz., for a well-to-do family, besides other foodstuffs in the way of pulses, milk, oils and vegetables. Dr. Slater in his studies of South Indian Economics estimates the daily ration of raw rice at 27 oz., and of ragi at 25 oz. In the absence of any recorded statistical data on this point, the best way to arrive at the actual ration would appear to be to use a number of these arbitrary figures and see how they agree or differ from the actual state of things determined by taking into consideration the total production, the exports and imports and the probable consumption of cereals in each district."

218. Taking into consideration the various figures referred to above and the actuals of production, exports and imports and also making allowance for a probable higher rate of consumption in the producing districts and a lower rate in importing districts, the following table of percapita needs of millets and rice was drawn up by

[1] Report of the Rice Production and Trade in the Madras Presidency by C. R. Srinivasan, page 15.

[1] Sri C. R. Srinivasan as representing the nearest approach to actual facts—

District.	Millets in ounces.	Rice in ounces.	Remarks.
(1)	(2)	(3)	(4)
Circars—Ganjam, East and West Godavari, Kistna and Guntur.	26	26	Producing districts—Consume raw rice.
Nellore	32	26	Do.
Ceded districts	36	24½	.
Anantapur	26	24½	..
Chingleput	26	24½	Producing district—Partly raw and partly boiled rice.
Tanjore	26	24½	..
Coimbatore	26	24½	Industrial town and garden land cultivation.
South Kanara	26	24½	..
South Arcot	26	24½	..
Malabar	26	24½	..
Madras .	..	22	Purchasing centre.
Trichinopoly	26	19½	Purchasing district—Consumes boiled rice.
North Arcot	26	19½	Do.
Salem	26	19½	Do.
Chittoor	26	19½	Do.
Ramnad	26	19½	Do.
Tinnevelly	26	19½	Do.
Madura	26	19½	Do.
Nilgiris	26	19½	Do.

It must be pointed out that the variations in per capita requirements of rice between one group of districts and another are rather too wide to be accepted as entirely correct. The difference is based on two considerations, viz., (1) that per capita consumption is more in producing districts than in purchasing districts and (2) that per capita consumption of boiled rice would be less than that of raw rice. While the latter assumption may be correct, the former is mainly an economic and not a physiological ground and as such, has no place in the present calculations which proceed on the assumption of a better economic state in the post-war world. Even as things are, it is doubtful whether the average man in Trichinopoly or in the Tinnevelly district eats less rice than the man in Tanjore as the above figures would have us believe. Taking the existing conditions as they are, the only conceivable grounds of different per capita consumption are (i) the manual labourer and the villager would require more rice than the sedantary worker and the urban resident; and (ii) the poorer classes actually consume probably less rice than the well-to-do, an economic factor not of universal application. It will be clear that persons coming under either group exist in every district and there is not much justification for varying the per capita consumption with reference to the administrative divisions of the Province. It seems desirable and more in accordance with the probable actual conditions to assume a fairly steady per capita consumption; and for purposes

[1] Report of the Rice Production and Trade in the Madras Presidency by C. R. Srinivasan, page 18.

of a fair average, 24 oz., or $1\frac{1}{2}$ lb., per head per diem of rice would be a suitable figure. It is relevant to point out that in the rationing scheme originally in vogue, the ration per head per diem was fixed as 1·108 lb. of rice for the intellectual worker and an increase of 50 per cent was considered necessary for those engaged in occupations involving heavy manual labour, i.e., 1·7 lb., roughly. The rural population as a rule consume more rice than the urban and as the rural population constitute about 85 per cent of the total in the Province, the average per capita need of rice should approximate, more to 1·7 lb., than 1·108 and the average of 1·5 lb., suggested above, does not seem to be an unduly high figure.

219. As regards millets, Sri C. R. Srinivasan's table assumes 36 oz. per head per diem in the Ceded District, 32 oz. for Nellore and 26 oz. for the rest of the Province. An average of 1·75 lb., or 28 oz., per head per diem seems to be a reasonable figure for millets.

Based on the above assumptions, the requirements of the Province have to be determined on the lines indicated earlier, i.e., by determining first the number of persons for whom the present local production of millets in this Province is sufficient and the quantity of rice required per annum for the rest of the population. It seems unnecessary to deal with each district separately for this purpose, as plans of development have to be considered for the Province as a whole, and it is neither necessary nor at all possible to make each district self-sufficient. The position for the Province as a whole is, therefore examined in the following calculations.

Millets available—Net imports and local production

220. Details of imports and exports of jowar and bajra by sea and rail for the years 1938–39 to 1945–46 are given in Appendix 17. It will be seen that conditions of import and export fluctuate wildly from year to year due probably to the varying conditions of local production and availability at the exporting end from year to year. The average net import of millets into this Province is about 19,000 tons annually.

The Season and Crop Report furnishes figures of normal production of millets in this Province. The figures represent unhusked grains and the loss by husking has to be taken into account. This varies with different kinds of millets as shown below :—

Variety of millet.	Loss by husking. PERCENTAGE.	Variety of millet.	Loss by husking. PERCENTAGE.
Cholam	15	Varagu	40
Cumbu	20	Samai	45
Ragi	10	Maize	40
Korra	20		

Making allowance for this loss by husking, the net quantity of cleaned millets, normally produced in this Province has been worked out and is given in Appendix 15 for each district. The figures exclude certain minor millets (wheat, varagu) for which

figures of normal production are not given in the Season and Crop Report. The total acreage under these " other cereals " is however, a not negligible figure—572,730 acres for the Province. No figure of normal yield has been given, and in the absence of any information the production of cleaned grain under the head " other cereals " may be assumed to be about 150,000 tons (based on the average yield of other cereals) and this will have to be added to the total of millets given in Appendix 15. The total production of cleaned millets will then be as summarized below :—

	TONS.		TONS.
Cholam	1,074,213	Maize	18,504
Cumbu	548,392		
Ragi	737,766		2,833,939
Korra	199,192	Other cereals	150,000
Varagu	195,306		
Samai..	60,566	Total	2,983,939

Some deduction will have to be made from this figure for seed purposes. The requirements on this account are said to be about 1 to 2 per cent of the yield. The net quantity available for consumption may be roughly put down as 2,940,000 tons annually, taking local production alone into account.

221. It has been noticed already that no satisfactory data are available to show directly what quantity of millets is actually required for consumption; that the figure of net imports is hardly likely to represent the extra quantity that can be consumed over and above local production; and that the best way to determine the deficiency is to determine it in terms of rice by finding out the population that can subsist on the millets actually produced and assuming that the rest require rice. This is worked out below :—

(1)	Estimated population of the Province in 1944.	50,990,000
(2)	Population in terms of adults	38,243,000
(3)	Millets produced annually	2,940,000 tons.
(4)	Per capita requirement of millets per diem..	28 oz.
(5)	Population for which the millets would be sufficient	10,310,000
(6)	Balance of population in terms of adults that require rice	27,933,000
(7)	Per capita needs of rice per diem	24 oz.
(8)	Quantity of rice required for the population in item (6) above per annum	6,827,000 tons.

Local production of rice and the deficit to be made up

222. The average annual production of rice, in terms of husked, cleaned grain, is of the order of 5 million tons, in the Madras Province (excluding Ganjam). Details of production for the years 1924–25 to 1944–45 are given in Appendix 14. The trend of

production for the Province as a whole during the past about 27 years is given below :—

Production of rice (000 tons) in the Madras Province

Year.	Irrigated.	Unirrigated.	Total.	Total (excluding Ganjam).
(1)	(2)	(3)	(4)	(5)
1918–19	3,327	897	4,224	3,993
1919–20	4,354	1,044	5,398	5,044
1920–21	3,886	1,101	4,987	4,703
1921–22	4,152	1,077	5,229	4,871
1922–23	4,072	1,150	5,232	4,890
1923–24	3,529	1,002	4,531	4,270
1924–25	3,834	1,074	4,908	4,529
1925–26	4,212	1,110	5,322	4,915
1926–27	3,647	1,095	4,742	4,384
1927–28	3,955	1,127	5,082	4,054
1928–29	4,073	1,124	5,197	4,811
1929–30	4,055	1,104	5,159	4,813
1930–31	4,256	1,119	5,375	4,967
1931–32	4,255	1,130	5,385	5,087
1932–33	4,324	1,082	5,406	5,082
1933–34	4,201	1,113	5,314	4,943
1934–35	3,958	1,023	4,981	4,656
1935–36	4,005	875	4,880	4,850
1936–37	3,987	808	4,795	4,795
1937–38	4,042	808	4,850	4,850
1938–39	3,376	724	4,100	4,100
1939–40	3,693	774	4,467	4,467
1940–41	4,340	810	5,150	5,150
1941–42	4,113	842	4,955	4,955
1942–43	3,796	818	4,614	4,614
1943–44	4,138	794	4,932	4,932
1944–45	4,288	766	5,054	5,054

It is seen that the production has been less than 5 million tons in 22 out of the 27 years for which figures are furnished above. Though one would ordinarily expect a gradual increase in production, in view of the gradual development of irrigation facilities, improved seeds and methods of cultivation, no such increase is noticed in these figures. Whatever be the reason for this, the fact is that the production is more or less a steady figure and that the assumption of 5 million tons would rather be an over-estimate than otherwise.

223. Some allowance will have to be made for seeds, and for conversion into rice products. Requirements for other uses such as stock feeding, and industrial purposes, are negligible. A small quantity of paddy is used to feed working animals in the puddling season in the Godavari district but the quantity is infinitesimal and may be ignored. As for industrial uses, broken rice is used in the sizing industry, the average quantity being estimated at 100 lb. per handloom per year. Also, washermen use broken rice for " kanji " for cleaning. On the whole, the quantity of rice used for sizing is relatively small, about 5,000 tons in India, as a whole, and may safely be ignored. Thus, seed and rice products are the only items that need be taken into account.

Cecil Wood gives the seed rate at 50 to 75 lb. per acre for broadcast paddy and a figure varying between 20 and 150 lb. per acre for transplanted paddy. The margin of variation especially

in the latter case is so wide as to make his figures entirely useless for calculations. The Provincial Marketing Officer has estimated the seed rate as about 41 lb., per acre in the case of transplanted paddy and 81 lb., per acre for broadcast paddy. The bulk of the paddy area is of the transplanted variety and the average seed requirement has been estimated as about 3·4 per cent of the production. This is likely to be a slight under-estimate. For conversion into parched rice, and beaten rice, about 1 per cent of the production may be required. For seed and these other purposes, a round figure of 5 per cent may be allowed. From the estimated total production of 5,000,000 tons, a quantity of 250,000 tons may be deducted on this account. We are thus left with about 4,750,000 tons of rice for consumption as staple food in the Province. And setting it against the estimated requirements of 6,827,000 tons previously calculated, we are faced with a deficit of 2,077,000 tons of rice annually for the Province as a whole.

Examination of the deficit

224. The deficit is a rather startling figure. Usual calculations of the production and supply position of the Province have led one to believe that the normal rice deficit is something like 300,000 or 400,000 tons. The figure arrived at above is more than five times this and it seems therefore necessary to subject it to a searching scrutiny. The source of the figures used and the method of calculations adopted have been explained above. The requirements of rice as worked out are based on certain assumptions regarding—

(*a*) population;
(*b*) production of millets;
(*c*) per capita needs of millets and rice; and
(*d*) production of rice.

It is worthwhile looking into the margin of probable error in these assumptions. The population figures are based on the census of 1941 with an allowance for further increase in 1944. There is no likelihood of error in it. As regards conversion of the total population in terms of adults, the factor assumed was 0·75 (or 75 per cent) as determined by Sri C. R. Srinivasan in his report on "Rice production and trade in the Madras Presidency"[1]. There is no reason to question this ratio. As for the quantity of millets produced, it was worked out from the figures of normal production of unhusked millets given in the Season and Crop Report of 1943–44 and the loss in husking was adopted also from the same source. If the figures of normal production given in the Season and Crop Report of 1941–42 are taken, a slight increase is noticed, i.e., the normal production of husked millets in that case works out to 3,102,137 tons as against 2,833,939 tons assumed in this note on the basis of the normal figures given in the 1943–44 report. The difference is about 268,000 tons or about 9 per cent. But, if the figures of actual production in 1941–42 are taken, the total millet production (cleaned grain) comes to only 2,796,864 tons which is

[1] Report of the Rice Production and Trade in the Madras Presidency by C. R. Srinivasan, page 15.

even less than what has been adopted as normal here. It does not therefore appear that the figure of 2,833,939 tons is an under-estimate. An addition of 150,000 tons was made to this figure on account of 'other cereals' for which no figures of production are given in the Season and Crop Report. This was a rough estimate based on the normal acreage under these cereals, viz., 572,730 acres. A comparison of the total acreage and total production of the millets for which figures are available shows that on the average one acre under millet crop yields roughly one-fourth ton of cleaned grain. For want of any other information, this ratio was adopted for the "other cereals" and the assumption of 150,000 tons of cleaned grains for an acreage of 572,730 under this head would thus appear quite reasonable.

225. As regards per capita requirements of millets and rice adopted, viz., 28 oz. and 24 oz. per head per diem, respectively, on the average, for all the districts of the Province, this is a slight departure from the procedure adopted by Sri C. R. Srinivasan who assumed different rates for different groups of districts. The reasons for not adopting his figures have been explained earlier. Apart from this, the difference in requirements as determined by the two processes may as well be worked out to see if it is an appreciable figure. Taking the figures in Table 15 at page 19 of Sri Srinivasan's report the adult population for whom 3,638,833 tons of millets are sufficient is given as 12,706,116 the per capita needs being assumed at the variable scale given in Table 14 at page 18 of that report. If, a uniform rate of 28 oz., of millets is adopted for all districts, the resulting population for whom the same quantity of millets would suffice comes to about 12,760,839 against 12,706,116 referred to above. The error is less than 1 per cent. Similarly, in respect of rice, according to the variable ration given in Table 14 of the report, it was estimated that a population of 22,080,266 would require 5,146,151 tons. If the flat rate of 24 oz., adopted here were assumed, the same population would require about 5,397,000 tons. The difference works out to about 251,000 tons. This represents an error of about 5 per cent. But in this case it must be stated that a higher ration than that adopted by Sri C. R. Srinivasan has been advisedly provided for. There is therefore no necessity to revise the figure on this account. As regards local production of rice, the figure of 5 million tons assumed here is accepted on all hands and there is no need to make any special scrutiny of it. The deficit figure arrived at therefore requires no revision.

226. The following comparative statement of the position as it existed about ten years ago and as it stands to-day also leads to the same conclusion :—

	As it stood about 10 years ago (as given in Sri C. R. Srinivasan's report).	As it stands now.
Total population of the Province	**46,381,849**	**50,990,000**
Population in terms of adults ..	**34,786,382**	**38,243,000**
Quantity of millets produced (tons)	**3,638,833**	**2,940 000**
Quantity of rice produced (tons)	**5,036,332**	**5,000,000**

It is seen that while the population has increased by about 10 per cent the production of millets has gone down by as much as 19 per cent and rice production has remained practically stationary. The increase in population and the decrease in millet production taken together would account for a deficit of over a million tons and the fact that even in the early years of the last decade the net imports of rice were about 300,000 tons would account for a further deficit of nearly half a million tons to-day. These facts justify a deficit of about 1½ million tons. The balance of deficit (according to the figures worked out in this chapter) is about half a million tons and this is accounted for by the optimum conditions of consumption assumed for present purposes.

If, therefore, the correctness of the calculations and of the method adopted here is accepted the next question is how this huge deficit of over 2 million tons of rice annually is being met at present.

Appendix 19 gives details of imports of rice and paddy by sea and rail for the 14 years from 1930–31 to 1943–44 so far as this Province is concerned. An abstract of the figures is given below :—

Year.	Paddy (000 tons). Foreign.	Paddy Other provinces. Rail.	Paddy Other provinces. Sea.	Paddy Total.	Rice (000 tons). Foreign.	Rice Other provinces. Rail.	Rice Other provinces. Sea.	Rice Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1933–34 ..	79·9	9·7	5·4	95·0	601·5	52·9	10·5	664·9
1934–35 ..	181·4	18·6	4·6	204·6	929·2	37·8	6·1	973·1
1935–36 ..	199·5	49·6	8·2	257·3	868·0	52·1	4·8	924·9
1936–37 ..	88·0	41·4	5·3	134·7	690·8	55·7	6·1	752·6
1937–38 ..	31·1	41·5	5.7	78·3	679·6	113·0	9·7	802·3
1938–39 ..	74·3	39·4	6·7	120·4	6[illegible]4·0	105·2	12·4	801·6
1939–40 ..	308·1	55·0	1·5	364·6	822·7	87·5	20·3	930·5
1940–41 ..	37·3	26·4	0·9	64·6	509·3	50·8	9·8	569·9
1941–42 ..	0·4	13·3	0·2	13·9	355·5	29·6	1·8	386·9
1942–43 ..	..	13·7	0·1	13·8	16·9	17·8	2·0	30·5
1943–44 ..	..	3·0	7·6	10·6	..	26·2	62·4	88·6

(These figures include the share belonging to Cochin which will be deducted when calculating net imports.)

Appendix 20 gives details of exports of rice and paddy by sea and rail for the 14 years from 1930–31 to 1943–44 from this Province. An abstract of the figures is given below :—

Year.	Paddy (000 tons). Foreign.	Paddy To other provinces. Rail.	Paddy To other provinces. Sea.	Paddy Total.	Rice (000 tons). Foreign.	Rice To other provinces. Rail.	Rice To other provinces. Sea.	Rice Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1934–35 ..	2·2	2·4	0·2	4·8	72·9	121·2	2·0	196·1
1935–36 ..	2·5	2·0	..	4·5	70·4	139·6	3·1	213·1
1936–37 ..	0·4	1·8	2·0	4·2	83·9	137·9	5·1	226·9
1937–38 ..	0·5	1·2	0·5	2·2	88·4	131·8	3·6	223·8
1938–39 ..	1·6	3·8	1·6	7·0	99·5	152·7	5·6	257·8
1939–40 ..	3·0	5·6	1·3	9·9	96·2	178·1	5·6	279·9
1940–41 ..	1·6	2·2	0·6	4·4	115·5	123·2	4·7	243·4
1941–42 ..	25·7	9·3	0·6	35·6	143·5	228·0	11·4	382·9
1942–43 ..	7·7	3·2	..	10·9	125·2	153·1	5·1	283·4
1943–44 ..	..	1·5	1·0	2·5	25·9	24·0	0·5	50·4

In working out the net imports, allowance is made for the quantity of rice and paddy imported into Cochin Port and for that

portion of these imports which is exported into the Madras Province from this port.

Net imports into Madras Presidency excluding Cochin

Quantity in 000 tons. (Rice and paddy converted into rice at 67 per cent)

—	1930–31 to 1934–35 (average).	1935–36.	1936–37.	1937–38.	1938–39.
(1)	(2)	(3)	(4)	(5)	(6)
Imports—					
Rice—					
Foreign	543	868	691	680	684
Coastal	17	5	6	10	12
Rail	29	52	56	109	106
Paddy as rice—					
Foreign	72	133	59	21	50
Coastal	5	5	4	4	5
Rail	11	33	28	27	26
Total imports ..	677	1,096	844	851	883
Deduct—					
Share of Cochin—					
Rice..	..	350	327	349	301
Paddy as rice	291	58	26	18	13
Balance ..	386	688	491	484	569
Add—					
Estimated exports from Cochin to Madras by road and rail	46	70	60	130	100
Deduct—	432	758	551	614	669
Rail-borne exports ..	78	141	107	133	133
Sea-borne exports ..	77	74	90	93	108
Net imports ..	277	543	354	388	423

	1939–40.	1940–41.	1941–42.	1942–43.	1943–44.
	(7)	(8)	(9)	(10)	(11)
Imports—					
Rice—					
Foreign	823	509	356	17	..
Coastal	20	10	2	2	62
Rail	88	51	30	18	26
Paddy as rice—					
Foreign	115	25	..	..	..
Coastal	1	1	..	..	5
Rail	37	18	9	9	2
Total imports ..	1,114	614	397	46	95
Deduct—					
Share of Cochin—					
Rice..	321	116	206	16	61
Paddy as rice	61	8	..	..	5
Balance ..	732	490	191	30	29
Add—					
Estimated exports from Cochin to Madras by road and rail	100	20	62	..	..
Deduct—	832	510	253	30	29
Rail-borne exports ..	184	125	234	155	25
Sea-borne exports ..	105	121	173	137	27
Net imports ..	543	264	—154	—262	—23

Omitting 1940–41 and the subsequent period as abnormal years it is seen that while the average net imports for the five years ending 1934–35 was 277,000 tons the figure oscillated between 354 and 543 during the succeeding five years. Also during the four years 1936–37 to 1939–40, the net imports steadily rose from 354,000 tons to 543,000 tons. The increase, however, stands no comparison with the progress in requirements and is far below the calculated deficit of 2,077,000 tons.

227. Two important questions arise from the position as revealed above :—

(1) Why has millet production gone down considerably?

(2) How has the population been able to feed itself with a net import of only about half a million tons of rice while even according to the old scale of per capita consumption the deficit is at least 1½ million tons?

228. The fall in millet production shown by the comparative statement in paragraph 220 is about 700,000 tons. Appendix 12 gives the acreage under the main groups of food and non-food crops for the past twenty-five years. It is seen that the millet acreage which was about 14 million acres in the twenties fell to about 13 million acres in the later thirties. Part of this fall is attributable to the transfer of Ganjam and part of Vizagapatam districts to Orissa, but even in the years preceding the transfer the millet area shows a gradual decline. The chief reason seems to be that millets were gradually replaced by money crops, particularly groundnut, the acreage under which shows a remarkable increase during these twenty-five years. This is indicated by the figures of acreage under oil seeds given in column (6) of Appendix 12 which rose from about 3½ millions in 1920–25 to about 6 millions in 1935–40. The increase is even more clearly indicated by the figures for groundnut acreage given below :—

Groundnut area (000 *acres*)

1920–21	1,600	1933–34	3,779
1921–22	1,459	1934–35	2,351
1922–23	1,754	1935–36	2,525
1923–24	1,812	1936–37	3,495
1924–25	1,904	1937–38	4,658
1925–26	2,599	1938–39	3,772
1926–27	2,680	1939–40	3,618
1927–28	3,337	1940–41	3,922
1928–29	3,679	1941–42	2,784
1929–30	3,209	1942–43	3,382
1930–31	3,572	1943–44	3,559
1931–32	2,635	1944–45	4,300
1932–33	3,517		

The groundnut area has more than doubled itself from 1,600,000 acres in 1920–21 to 4,300,000 acres in 1944–45, the increase being practically steady, except for certain years like 1931–32, 1934–36 and 1941–42 affected partly by international trade conditions. The

point for present purposes is that the millet area has declined. Rice, after allowing for the transfer of Ganjam to Orissa, has been more or less stationary.

The net result is that cereal production has gone down though the population has gone up. This brings us to the second question propounded above, viz., how has the increased population been reconciling itself to decreased food production? Does it indicate an increase in the proportion of the poorer classes which is unable to find sufficient food? These are interesting questions but not quite relevant in a discussion of facts rather than causes and are hence by-passed.

Pulses

229. Under food crops, pulses also have to be considered, so that measures to overcome deficits may include the deficit in this important item of food grains. The chief varieties of pulses (or grams) are: redgram, blackgram, greengram, Bengalgram and horsegram. The area under each variety except Bengalgram is given in Appendix 21. During 1943–44, an area of 65,000 acres was raised with Bengalgram and the maximum areas were grown in the districts of Kurnool (15,000 acres), Bellary (10,000 acres), Anantapur (7,700 acres), Guntur (8,000 acres), Vizagapatam (5,800 acres) and East Godavari (5,000 acres). The area under other minor pulses during the period from 1939–40 to 1943–1944 was as shown below :—

Year.	ACRES.	Year.	ACRES.
1939–40	235,000	1942–43	276,000
1940–41	233,000	1943–44	247,000
1941–42	247,000		

The Season and Crop Report does not give the yield of all varieties of pulses but only the acreages under each variety. The figures in column 4 of the Appendix 12 show the acreage under all the pulses together for the past twenty-four years from 1921–22 to 1944–45. Except in the six years 1929–30 to 1934–35, which in fact appear to have been the best period for all crops during the last twenty-four years, the area under pulses has been a little below 3 million acres and in the excepted half a dozen years, a little over that figure. Figures of production (unhusked pulses) and net imports for the nine years from 1935–36 to 1943–44 are given in Appendix 18. Taking the years from 1935–36 to 1939–40 as representing a normal period, it will be seen that the production averages round about 250,000 tons annually and that the average net import of pulses is also about 250,000 tons, the usual sources of import being Burma, Bombay, United Provinces, Sind, Punjab and Orissa.

From the figures of local production and net imports given above, the annual consumption of pulses at present works out to about 500,000 tons. Appendix 22 gives the requirements of

pulses for each district. If the average net imports are taken to represent the normal deficit, the Province is about 50 per cent deficit in pulses. The general objection already raised against equating the real needs to the actual consumption applies a *fortiori* to pulses. According to Dr. Aykroyd, the per capita need of pulses is 3 oz., per diem and it is stated that actual consumption in this Province is less than 1 oz., or is only about a fourth of the needs. Viewing the production and net imports against this background of physiological needs, it will be apparent that while the present production is less than half of the present consumption, the present consumption itself is less than a third of the real requirements. There is thus a clear case for increasing the production of pulses sixfold if the Province is to be self-sufficient.

Other food crops

230. The other food crops of any importance are wheat, chillies and coriander. As regards wheat, local production is only about 2,000 tons, a negligible quantity grown chiefly in the districts of Kurnool, Bellary, Anantapur, Salem, Madura and the Nilgiris. The wheat acreage in these districts is given below :—

Districts.	Acreage in 1941–42.	Acreage in 1944–45.
Guntur	..	785
Kurnool	1,699	1,308
Bellary	5,052	3,864
Anantapur	1,707	1,398
Salem	1,081	1,088
Madura	1,037	820
The Nilgiris	1,720	844
	12,296	10,107

Negligible patches are grown with wheat in certain other districts also. As against the local production of 2,000 tons the net imports of wheat into this Province are about 18,000 tons as wheat and 44,000 tons as wheat flour. (*See* Appendix 18.) The fact that in spite of comparatively large imports, local production has shown no tendency to increase shows that natural conditions in the Province do not favour the growth of this crop. This is borne out by the following extract from the Marketing Report on Wheat :—

" The crop in this Presidency is not remunerative compared with other cereals like cholam. Wheat straw has no fodder value. There is often fodder scarcity in areas like the Ceded Districts and wheat does not find favour with the growers. The crop is susceptible to ' rust.' Crop failures are common in the case of wheat. Wheat is not a staple crop of the Presidency and there is therefore no incentive for the extension of its cultivation . . . The

grains do not set properly in places not having sufficient wintering. Such places being limited, there is not much scope for the extension of cultivation." Thus, though from the point of view of demand, a large increase in production would be desirable, natural conditions of climate are unsuitable.

As regards chillies and coriander full details of imports are not available but it is stated that this Province is slightly in deficit in regard to these commodities.

Estimate of qualitative deficiencies of the Madras Province

231. Proceeding to a study of qualitative deficiency of food in the Province, the problem may be examined under the following heads :—

(1) Nutritional needs of a healthy individual as estimated by the various authorities on nutrition and the quantitative estimate of food requirements based on such a study;

(2) quantitative estimate of food production under various nutritional heads; and

(3) estimate of deficiency under the various nutritional heads.

Estimate of nutritional needs

232. According to the findings of modern nutritional science, a satisfactory diet should include, in addition to cereals, adequate quantities of other foods, such as milk, pulses, vegetables, fruits, meat, fish and eggs. It has been found, in surveys of typical urban and rural groups, that the calorie intake of some 30 per cent of families is below requirements and that even when the diet is quantitatively adequate it is almost invariably ill-balanced, containing a preponderance of cereals and insufficient "protective" foods of higher nutritive value. Intake of milk, pulses, meat, fish, vegetables and fruit is generally insufficient. In terms of food factors, the most important deficiencies are those of proteins of high biological value, fat, vitamin A and carotene, vitamins of B group and calcium. Intake of vitamin C is generally low. There is also deficiency of vitamin D in the diet which may lead to ricketic diseases. Evidence from the clinical side regarding the incidence and prevalence of deficiency diseases in general supports these conclusions. The percentage of underfed population in this country is by no means negligible and any estimate of requirements on the basis of actual consumption by such underfed strata will not be correct. It is stated that the average daily *per capita* consumption of rice in this Province is about 1·5 lb. which is considerably more than the quantity required for a well-balanced diet.

Dr. Aykroyd has cited the following as an example of a well-balanced diet[1] :—

	Daily quantity per adult. oz.
Rice	10
Millets	5
Pulses (dhall arhar 1 oz., blackgram 2 ozs.) ..	3
Milk	8
Non-leafy vegetables .. .. (Brinjal 2 ozs. ladies fingers 1 oz. snake gourd 1 oz., cluster beans 1 oz. and drumstick 1 oz.)	6
Green leafy vegetables .. .. (Amaranth leaves 2 ozs., drumstick leaves 1 oz. and spinach 1 oz.)	4
Fats and oils	2
Fruits .. .. (Mangoes 1 oz. and ripe plantains 1 oz.)	2

233.[2] He estimated that the pre-war cost of this well-balanced diet would be about Rs. 5 to Rs. 6 per adult per month. The cost at present prices would be more nearly Rs. 15 per adult per month or Rs. 75 for a family of five. Having regard to the low *per capita* annual income of about Rs. 30 of the agricultural population, it is obviously beyond the means of many to secure a well-balanced diet. It has been estimated in an earlier paragraph that the total population of the Province in 1944 in terms of adults was 38,243,000. The total food requirements of this population on the basis of the well-balanced vegetarian diet suggested by Dr. Aykroyd are worked out below :—

	Requirements for a day. TONS.	Annual requirements. TONS.
Rice	10,670½	3,894,725
Millets	5,335¼	1,947,363
Pulses	3,201	1,168,416
Milk	8,536¾	3,115,779
Non-leafy vegetables	6,402	2,336,832
Green leafy vegetables	4,268	1,557,890
Fats and oils	2,134	778,945
Fruits	2,134	778,945

Production of food under nutritional heads

234. The normal production of food in this Province under the various nutritional heads is given below :—

	TONS.		TONS.
1. Rice ..	4,750,000	6. Green leafy vegetables	19,030
2. Millets ..	2,940,000	7. Fats and oils ..	365,572
3. Pulses ..	264,962	8. Fruits	..
4. Milk ..	1,898,000	9. Meat and eggs ..	145,000
5. Non-leafy vegetables	781,100	10. Fish	179,529

[1] The nutritive value of Indian foods and the planning of satisfactory diets—Health Bulletin No. 23, 1938, page 14.

[2] *Ibid.*, page 15.

It is generally recognized that the existing food production data are inaccurate. Production figures are calculated from area by applying two factors, the "standard yield" and the "seasonal condition factor." Unless both the factors are correctly assessed, the estimate of production will not be correct. Since the great bulk of the typical Indian diets is composed of cereals which usually provide 80 to 90 per cent of total calories, it is particularly important that adequate information should exist about the supply of these basic foods. In regard to vegetables and fruits, similar factors leading to errors and gaps in production figures are operative but the position is worse since the classification is faulty, fruits and vegetables not being satisfactorily separated in the returns. It may be added that accurate statistics of fruits and vegetable production scarcely exist in any country, largely because of the difficulty of taking into account production in small gardens and allotments. Rough estimates have been made of the production of milk, fish and meat and there is no means of assessing the degree of their accuracy.

Estimate of deficiency

235. A statement showing the estimate of requirements of articles of food, production and deficiencies under the various nutritional heads is given below :—

Statement showing the estimate of quantitative requirements, production and deficiencies under the various nutritional heads in this Province

Serial number and items. (1)	Annual requirements. (2) TONS.	Annual production. (3) TONS.		Quantity of deficiency. (4) TONS.
				(+or —)
1 Rice	3,894,725	4,750,000	+	855,275
2 Millets	1,947,363	2,940,000	+	992.637
3 Pulses	1,168,416	264,962	—	903,454
4 Milk	3,115,779	1,898,000	—	1,217,779
5 Non-leafy vegetables	2,336,832	781,100	—	1,555,732
6 Green leafy vegetables	1,557,890	19,030	—	1,538,860
7 Fats and oils ..	778,945	365,572	—	413,373
8 Fruits	778,945	..		..
9 Meat and fish ..	778,945	145,000 179,529	—	454,416

The following conclusions follow from a careful reading of these figures :—

(1) The Province is deficient in respect of most of the foods that go to make up a balanced diet.

(2) There is a preponderance of cereal cultivation.

(3) Paradoxically enough, while there is a deficiency of 2 million tons of cereals by taking 24 oz., as the requirements of an individual, by taking 15 oz., and adding the various other kinds of foods that make up a balanced diet, there is found to be an actual surplus of cereal production.

In planning for meeting the food deficiencies of the Province it is necessary to take into account the habits of the people which can be changed only gradually and what is more, the economic condition of the people which influences diet to a large extent. It is common knowledge that as one goes down the economic scale in society, the proportion of the income spent on food increases. The poorer classes have to make up the calorie values by means of cereals. Ninety-five per cent of the population cannot afford the balanced diet prescribed by Dr. Aykroyd. The growing of a sufficient quantity of the foods necessary for a balanced diet should therefore be made part of a long range plan of economic progress which in turn increases the income of the individual. It is impractical as an immediate plan. Commenting on the qualitative production targets for food, the Famine Enquiry Commission, 1945, said that they " represent a very remote ideal." The United Nations Conference on Food and Agriculture, 1943, also recommended that dietary standards or allowances based upon a scientific assessment of the amounts and quality of foods, in terms of nutrients which promote health should be adopted as the *ultimate* goal of food and nutrition policy. The Conference at the same time recognised that it would be necessary, in the poorer countries of the world, to set up intermediate objectives more easy of attainment, which with the continued and expanding application of science to the development of the world's food resources, can be gradually raised in the direction of the ultimate objective. The Famine Enquiry Commission agreed with these views and said ' the chief value of production targets based on scientific assessment of nutritional requirements at the highest level, is that they indicate in a general way, the direction in which progress should take place, and thus provide guiding lines for food and agricultural policy. The suggestions in the following paragraphs must be appraised in the light of these comments. The present food crisis is best tackled with quantity in mind, more than any other factor. With this self-sufficiency achieved one can sit back and examine the problem of nutrition. This is not to minimize the importance of a balanced diet, but only to emphasize that because of the difficulties of (*a*) immediately planning for the production of the numerous kinds of food-stuffs that go to make up a balanced diet, (*b*) making such diet " effectively " available to the lower strata of society by increasing their incomes and (*c*) the need for urgently planning for self-sufficiency so as to prevent a recurrence of the present world-wide scramble for food, it is necessary to draw up a plan for urgently producing enough cereals at least to make this Province self-sufficient. Side by side, one should plan for producing more fish, eggs, vegetables, fats, milk and other food-stuffs. The demand for these will be inevitably conditioned by the general economic progress, and planning and development on all fronts is a pre-requisite for the production and consumption of these foods on a large scale. Quantitative self-sufficiency must therefore be taken as the immediate aim of food planning. The immediate aim

may therefore be to bridge the gap of 2 million tons of cereals already noticed.

236. The food deficiency of the Province can be made up by intensive and extensive cultivation. The scope for increasing production by intensive cultivation is apparent when the rice yields of Madras are compared with those of other countries.

Yield of rice per acre in other countries.	LB.	In other Provinces and States in India.	LB.
Spain	3,709	Madras	1,050
Italy	2,963	Bombay	967
Japan	2,053	Sind	861
Egypt	1,799	Assam	717
China	1,554	Bihar and Orissa ..	701
U.S.A. ..	1,413	Bengal	921
Siam	961	Hyderabad.. ..	689
Burma ..	845	Central Provinces ..	655
Indo-China ..	637	Mysore	699
Coorg	1,369	India (Average) ..	829

While the acreage yield in Madras is higher than in other parts of India (except Coorg) and certain eastern countries like Siam, Burma and Indo-China, it is far less than the acre yield in European countries and Eastern countries like Japan and China. The acreage yield in Japan is about twice that in Madras. It may be that higher yields are made possible in Japan on account of the limited area under rice in that country and the nature of the Government control exercised there. But even China, where conditions appear to be more or less similar to those obtaining in India, shows about 50 per cent more yield per acre than Madras. It will thus appear that, if proper measures are taken, considerable increases in the yield per acre can be effected. The adoption of intensive methods of cultivation is largely a matter in which the ryots have to take action. The poverty of the ryots and the small size of the average holding are factors that limit the possibilities of increase over existing yields. Extension of cultivation offers greater promise of practical success and quicker results in view of the fact that the burden of executing the necessary schemes, particularly in the matter of irrigation, is shouldered by the Government. But the Government require certain minimum returns on irrigation investments, and this is a limiting factor on extensions that are otherwise possible from a purely engineering and hydraulic point of view. Taking these limitations into account, and also the existing yields on the one hand and the area now cultivated on the other, it appears safe to divide the target increase into two halves, 50 per cent by extensive and 50 per cent by intensive cultivation.

This will mean that the deficit of 2 million tons of cereals should be made good as follows :—

(i) increase of 1 million tons by extension of cultivation; and

(ii) increase of 1 million tons by intensive methods of cultivation.

One million tons represent 12½ per cent of the present total yield of rice and millets which is roughly 8 million tons annually. It has been found that improved seeds alone will increase the yield by about 10 per cent and that proper manuring can improve the yield up to 25 per cent over the existing figures. The suggestion to work for an increase of 12½ per cent by a combination of the two seems quite practicable. The increase of 1 million tons by extension of cultivation will involve bringing about 2 million acres of new lands under cultivation and irrigation, on the accepted basis of half a ton per acre.

Extension of cultivation

237. Extension of cultivation depends mainly upon the availability of suitable water-supply. The land area of the Province comprises the following :—

	MILLION ACRES.
Area sown	32
Forests	13½
Not available for cultivation	14
Other uncultivated land excluding current fallows	11½
Current fallows	9
Total	80

Of these the most suitable areas must be looked for among current fallows. An enquiry made into the causes for such a large area coming under current fallows showed that current fallows comprised lands of the following descriptions :—

(1) Lands of the poorest class which might produce something in a favourable year but which in bad years would hardly repay the cost of cultivation.

(2) Uncultivable lands—rocks, wells, pools, cattle-sheds, clumps of trees and cart-tracks.

(3) Pasture lands, particularly in cattle breeding areas.

(4) Lands left waste in years of deficient rainfall.

(5) Lands purposely kept fallow by the ryots as annual cropping would not yield sufficient return to them.

(6) The low lying parts of the deltas, and in a few other districts, the marshy and saline areas.

In regard to unoccupied lands there was unanimity of opinion among the District Officers that large areas were totally unfit for cultivation and a cultivable part was often left waste due to inaccessibility and malaria. Want of labour in interior areas was another reason.

238. The Government have recently proposed a scientific study of land utilization in certain typical areas. Land utilization does not mean using the land to grow food or any other crops. It can only mean the optimum use of a particular land by reference to

the various conditions that influence vegetative growth—water, drainage, soil texture, alkalinity, soil ingredients, location and the like. Location is a factor of considerable importance. Land in the foreshore of tanks and in the catchment of rivers may be fertile but it will not be proper to plough them up; in fact, it will be very necessary to protect the surface by a cover growth of grass. In some of the large cattle producing areas like Palayakottai in Coimbatore pasture land is of immense value and necessary in the larger interests of the community. Some of the fallow lands will be infertile for agriculture but sufficiently fertile for growing certain hardy trees. Such tree growth is needed in the interest of substituting them for fuel in place of cow-dung. Thus the utilization of waste land is a complex problem of land utilization and it will be wholly incorrect to presume that with so much pressure on the soil such lands would have escaped cultivation if they had repaid the cost of raising a crop, or that even when reclaimed they will be suitable for agriculture. Land which is inaccessible and malarial stands on a slightly different footing. The Wynaad in Malabar and the Agency tracts in East Godavari and Vizagapatam are typical examples of these. Modern science has clearly shown that malaria is eradicable. In both these areas a scheme for anti-malarial operations and colonization has already been commenced. It is to be hoped that in a few years vast extents of lands will be made available in those areas for cultivation. The Wynaad scheme in Malabar now provides for reclamation of 28,000 acres. It adjoins the Nilgiris and in the Gudalur taluk of that district there are about 30,000 acres which can be reclaimed. The scope for reclamation in the Agency tracts is illimitable. It is a slow process but one well worth doing.

Credit may be taken over a ten-year period as follows :—

	ACRES.
(1) Extension of cultivation in uncultivated land	**600,000**
(2) Extension of cultivation in uncultivated land in Wynaad, Gudalur, Agency tracts and other hilly areas	**200,000**
	800,000

and at one-third of a ton of cereals per acre, they will give roughly 2½ lakhs of tons.

239. This is a modest target which can be achieved with the present resources of the Government and the people.

As regards irrigation projects they are treated as extensions for the present, though when single crop land is converted into double crop and when dry cultivation is converted into wet, one may legitimately call it intensive cultivation also. The following table shows the irrigation schemes proposed under the post-war

plan of the Government of Madras and the increase of food production resulting therefrom.

Statement showing the particulars of crops and yield estimated under certain specified schemes in the Province

Name of the irrigation scheme.	Estimated yield in tons. Paddy. (rice).	Cholam.	Ragi.	Sajja.	Korra.	Sugar-cane.	Other crops.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tungabhadra Project ..	12,921	39,029	47,666	2,812	17,857	228,732	16,376
Lower Bhavani Project ..	5,762	31,528	60,009	18,443	..	..	12,451
Gandikota Reservoir ..	60,135	15,178	2,585	..	1,516	..	19,727
Reservoir across the Godavari at Polavaram..	613,480	..	..	..	..	60,000	28,750
Rectification of drainage effects in West Godavari and Kistna districts	..	..	..	..	..	..	..
(a) Tammileru project ..	5,695	893	1,071	408	..	..	..
(b) Buddameru project ..	9,810	..	..	..	..	..	..
(c) Anumunilanka project ..	12,412	..	..	..	..	..	..
Gundalakamma project ..	13,039	..	..	..	..	..	..
Vaigai Reservoir project ..	20,856	393	1,339	268	..	107	..
Coringa Island project ..	3,139	..	..	..	..	..	..
Atteru Reservoir scheme ..	1,608	..	..	..	..	..	..
Pulikonda project	5,957	..	..	..	..	..	..
Upper pennar project ..	6,831	550	2,222	..	26	300	2,251
Gazuladinne project	4,003	..	171	..	..	1,067	2,451
Kattalai channel extension ..	4,998	..	..	..	..	..	..
Rallapad scheme	4,112	..	..	..	..	..	..
Peruvali channel extension (Pullambadi)	4,695	..	..	..	..	..	..
Total estimated yield ..	790,053	87,571	115,063	21,931	19,899	285,206	68,006

It will be seen from this table that even if the Ramapadasagar project takes time for completion in view of its magnitude, the other schemes between them will yield a million tons. This leaves out several smaller schemes of improvement in regard to minor irrigation and other sources.

The major schemes of irrigation development are :—

(1) Developing individual irrigation systems to the maximum capacity to cover their full ayacut. (There are many irrigation projects in the Province wherein the full designed ayacut has not yet been realised. In most of the cases investigations into the causes of the short development have been made and the necessary improvement measures are under consideration.)

(2) starting new irrigation projects;

(3) improvement or construction of several small irrigation systems under the Grow More Food Scheme; and

(4) construction of wells.

Intensive cultivation

240. Intensive cultivation envisages (1) the introduction of improved varieties of crops, (2) the adequate manuring of the crops, (3) the development of irrigation and supplying the crop with required quantities of water, (4) better cultivation with improved implements and (5) proper and timely control of pests and diseases. Item (3) has already been dealt with under extensive cultivation.

Introduction of improved varieties of crops

241. The results of various comparative trials with improved paddy strains evolved by the Agricultural department go to show

that they yield from 10 to 25 per cent more than the local types which they are intended to replace. The introduction of these improved strains so as to cover all parts of the Province can increase production at least by 10 per cent. [1] Dr. Burns has estimated 5 per cent as the probable increase in yield that can be expected by growing an improved variety. Under the "Grow More Food" campaign, seed farms have been organized in 13 rice districts, where out of a cropped area under rice of 72 lakhs of acres, 57 lakhs of acres, constituting half the rice area of the Province will be covered with improved strains by the end of 1946. It must be expected that the remaining 15 lakhs of acres in these districts will also be covered by "natural spread" in course of time. Outside these districts there are 3 million acres under rice distributed over 12 districts which have not come under any seed multiplication scheme yet. Steps have to be taken to introduce and spread improved strains in these areas without any further delay.

242. The spread of improved strains of millets has so far been limited, as the multiplication of improved millet seeds is of more recent origin. Seed multiplication schemes for cholam have now been organized in the Kurnool and Trichinopoly districts, for cumbu in the North Arcot and Tinnevelly districts, for ragi and korra in the Salem and Bellary districts. These schemes aim at a target of 8·37 lakhs of acres out of a total of nearly a million acres in these districts. Owing to the vicissitudes of the monsoons it is difficult to assess the increase in yields of millets from improved strains. Compared to the behaviour of an ordinary variety under similar conditions an improved strain can be expected to yield at least 5 per cent more. The Millet Specialist, after a series of trials, has estimated the increased production from improved strains between 10 and 15 per cent or an average of 12½ per cent. In view, however, of the uncertainties attached to the production of dry crops like millets, coupled with the insignificant progress in the spread of the improved strains, the anticipated increase has not been included in the target for increased production in the immediate future. There is need for increasing the spread of improved millet strains by extending schemes of seed multiplication to cover the whole Province. For a total millet area of 12 million acres in the Province, the work so far done is a mere beginning.

243. The work that still remains to be done to bring the entire paddy and millet area of the Province under improved strains can briefly be set out as follows :—

(1) to bring under improved strains the entire paddy area in the districts where seed multiplication schemes already exist;

(2) to introduce improved paddy strains in districts where no seed multiplication schemes now exist, by starting seed farms;

[1] Technological Possibilities of Agricultural Development in India by Dr. Burns, page 53.

(3) for millets, the work is more difficult in view of the vagaries of the season, the numerous varieties that are prevalent, and the large area that has to be covered. The work to be done is the evolution of the necessary number of improved strains suited to different areas and their introduction, multiplication and distribution in all millet areas within 5 years;

(4) to provide an adequate supervising agency, so that, the seeds of improved strains are properly utilised and not used for consumption;

(5) to undertake legislation, if necessary to ensure that ryots in a district use only certified seeds supplied by the Co-operative or the Agricultural Department or through approved dealers;

(6) to undertake the purchase, storage, and sale of improved seeds as far as possible through departmental agency or through such other organization as may be relied upon to carry out the work under the prescribed conditions;

(7) to run on a permanent basis a reasonable acreage of 'inner' seed farm under departmental control so that, even after the local strains have been entirely displaced, the inherent purity of the strain can be maintained;

(8) to subsidise ryots or distributors to a reasonable extent for a reasonable period for losses or inconvenience, they may be put to, by carrying out the instructions of the department; and

(9) to maintain a record of progress year by year on the field spread of the strains and to watch any setbacks which may occur.

By the methods outlined above it is possible to increase the production of rice at least by quarter of a million tons, an increase of 5 per cent. The increased production from millets, in view of its uncertainty, has not been taken into account.

Adequate manuring

244. Increased production from improved varieties has, however, its own limitations. Unless the standard of cultivation is simultaneously improved, the increased yield from a better strain may not be permanently maintained. In many parts of the Province, the fertility of the soil is stabilised at a low level. Under such conditions improved varieties may give higher yields in the initial stages but due to their higher uptake of nutrients may depress the low fertility level still lower, ultimately resulting in low crop yields from subsequent crops. Therefore, it is possible that the cultivation of an improved strain for a series of years may result in lowering the yield, unless the plant nutrients removed are replaced annually by adequate manuring. Better manuring results in better crops and bigger yields. Where water-supply is adequate, there is considerable scope for increasing production by suitable manuring, provided the quantity and the nature of the manure are adjusted to the soil types. Taking the rice crop, manurial experiments carried out in many places in this Province over many years indicate that yields can be increased by 20 to 25 per cent by a combination of organic and artificial fertilisers. In the Central

Agricultural Station at Coimbatore, by judicious green manuring and application of small supplementary doses of bone meal and ammonium sulphate, the fertility of the soil has been considerably improved and the average yield of paddy has gradually risen from 2,000 lb. in 1907 to nearly 4,000 lb. in 1935. At the Pattambi Agricultural Research Station, the application of neem cake and ammonium sulphate together to supply 45 lb. nitrogen per acre immediately increased the yield by 22 per cent. These are only two examples from a long record. Better manuring can safely be assumed to produce a 20 per cent increase in yield.

245. The Province has a total acreage of 11 million acres under rice and the estimated average official production is around 5 million tons. A 20 per cent increase in yield will produce a million tons more of rice. The manurial requirements for this increased production from groundnut cake alone will entail the application of 2½ million tons of cake, at 4 acres to 1 ton of cake. It is not, however, necessary or feasible to supply all this nitrogen from oil cake. It can be partly supplied as ammonium sulphate and partly as cattle manure or green manure. This emphasizes the need for conservation and proper utilization of all the available supplies of manure and further extension of cultivation of green manure. Bulky organic manures can be supplemented by artificials like ammonium sulphate. Even a supplementary dose of 1 cwt. per acre of paddy in the Province will require a supply of 50,000 tons of ammonium sulphate. The problem of manure deficiencies must be tackled on the following lines :—

(1) Better conservation of the cattle manure produced in the Province and its prevention for use as fuel. This can be done by supply of firewood at cheap rates and by developing village forests.

(2) Manufacture of composts in all municipalities and panchayat boards.

(3) Increasing areas under green manure crops by subsidising green manure seed production and distribution. The present policy of supplying water, free of charge must be continued and this facility should be given wide publicity.

(4) Increasing supply of green leaf manure by afforestation wherever possible, for instance the foreshores of irrigation tanks. The question of opening leaf mould depots by the Forest department should be examined.

(5) Encouraging the cultivation of perennial green manure crops like ' Glyricidea ' on field-bunds or waste lands.

(6) Increasing production of oil cakes in the Province by expanding the oil milling industry.

(7) Conservation and utilisation of bones by subsidising their collection and transport to required centres. The development of small bone crushing units in rural areas must be encouraged.

(8) Development of the fishing industry in the coastal areas and encouragement of the fish manure industry to increase the output of fish manure. Quality control by legislation is essential to prevent adulteration of fish manure which is rampant.

(9) Manufacture under Government auspices of large quantities of ammonium sulphate and required quantities of superphosphate and their distribution to cultivators through departmental depots.

Improvement in cultural practices

246. If the introduction of improved seed and the application of better manure should increase agricultural production adequately, they must be accompanied by efficient cultural practices. Good cultivation methods and proper agronomic management are essential for maximum crop production. They must be attended to at proper time and with the right implements.

The extent to which agricultural production can be increased by the use of better implements is largely unexplored. As bullocks form the main draught animals, their draught capacity limits the types of implements that can be used. Some progress has been made in improving the designs of agricultural implements, but there is still room for further research. Even small improvements bring about an appreciable increase in production.

There is a belief that power machinery like tractors will greatly assist agricultural production, but their use is limited by various circumstances. They are of no use in the vast rice areas of this Province. Further, there are little data available about their utility for the cultivation of other crops. They are, however, useful in places where there is labour shortage and also for reclamation of new land. There is need, therefore, for carrying out experimental work on the economics of power farming for their introduction wherever they are likely to be profitable. Though no conclusive experimental data are available of the increased outturns that can be expected by better tillage, it is generally observed that crop yields are improved by good cultivation and credit has to be taken for this factor. Whatever may be the limitations for mechanisation in the various field operations, there is considerable scope for the introduction of power machinery for other agricultural purposes, as for instance lifting water, transport and other purposes. The availability of cheap electric power and the installation of a large number of oil engines for this purpose has already in several districts, reduced the number of animals required and maintained for these operations. Animals and men both feed off the land. Engines do not. Any reduction therefore in the number of cattle for agricultural purposes will contribute to a better feeding of the remaining cattle and thus accelerate the pace of livestock improvement. There is thus special scope for the replacement of bullocks by mechanical power in operations, ancilliary to cultivation, of the nature mentioned above.

Control of insect pests and diseases

247. The loss in yield of crops due to the ravages of insect pests and diseases and the methods of control that have been successfully evolved to minimise these losses have been referred to in an earlier

chapter. Agricultural production can be increased by making proper arrangements for the protection of the crops. Wherever methods of control are known, steps have to be taken to ensure that they are generally adopted by the cultivators. Where scientific knowledge has not sufficiently advanced there is need for research and experiment, mostly of a long-term nature. The evolution of disease-resistant varieties and their cultivation will go a long way to control diseases. Large-scale manufacture of insecticides and fungicides and their use in the control of pests and diseases must be extended. Dr. Burns estimates that by the efficient control of insects pests and diseases, agricultural production can be increased by at least 5 per cent. This increase in production will also contribute to make up the agricultural deficit of the Province.

218. The results of the foregoing analysis of the several methods of bridging the gap between present production and requirements by extensive and intensive cultivation may now be summed up. The quantitative deficiency of 2 million tons of cereals can be made up as follows :—

(1) By extension of cultivation and irrigation ..	.. .. ..	1 million tons.
(2) By better manuring ..	.. ..	1 million tons.
(3) By crop improvement	.. ..	$\frac{1}{12}$ million tons.
(4) By crop protection ..	.. ..	$\frac{1}{4}$ million tons.
Total	..	$2\frac{1}{3}$ million tons.

This allows sufficient safety margins for seasonal variations of production and at the same time provides for the growing population which has been a normal feature of the Province.

Production can be increased by substitute cropping, i.e., cultivation of certain crops which inherently give large calorie values per unit area. The Famine Inquiry Commission, 1945, laid great stress on the increased production of certain tuber crops like potatoes and sweet-potatoes and also plantains. These crops give larger returns of food energy or calories per unit area than cereals, thereby releasing land for the production of other foods, notably protective foods which are in short supply. The calorie value of the foods mentioned and their chemical composition in respect of protein and carbohydrate are given in the following table :—

	Rice.	Potato.	Sweet potato.	Tapioca.	Plantains.
Moisture per cent	12·2	74·7	66·5	59·4	75·0
Protein per cent ..	8·5	1·6	1·2	0·7	1·2
Carbohydrate per cent ..	78·0	22·9	31·0	38·7	24·0
Calories per 100 grams ..	351	99	132	159	110

Though the calorie value of the tubers is comparatively lower than rice, still, the total output of calories per acre is much higher due to high yields obtained from them. The following table gives

the comparisons of calorie, protein and carbohydrate yield per acre of various foods, calculated on the fresh edible portion :—

	Rice.	Wheat.	Potato.	Sweet potato.	Tapioca.	Plantain.
Estimated yield per acre (maunds).	10	10	50	50	50	224
Protein yield (kilograms).	31	43	29	22	13	56
Carbohydrates yield (kilogrammes)	284	258	416	563	522	1,190
Calories per acre (in thousands)	1,280	1,260	1,790	3,880	2,880	5,040

From the table it is seen that the non-cereal foods give a considerably higher calorie yield per acre than rice. The importance of tuberous crops especially the potato in their cropping system has been well appreciated by various countries in the densely populated European continent. "The famines which normally devastated Europe became much less frequent after the potato was cultivated as a field crop in Europe." There is considerable scope for the increase of cultivation of sweet-potatoes, tapioca and plantains in most districts. Potatoes can be grown in the Nilgiris, the Agency, and the table land regions of the Salem district. Tapioca and sweet-potatoes, even in normal times contribute largely to the dietary of the population of Malabar and South Kanara where it is easily and extensively cultivated. Increased areas are now brought under these crops since the food crisis began. There is no reason why their cultivation should not be extended to other districts, where climatic and other conditions are favourable for their cultivation. Serious and deserved attention has not so far been paid to the popularization of these crops.

249. One disadvantage, however, with these tubers, is their poor protein content and therefore tubers must be supplementary to a good protein diet. The Famine Inquiry Commission made the following recommendations on this point :—

"The extended cultivation of potatoes and sweet-potatoes as supplementary foods should be one of the objectives of food policy. The sweet-potatoe is at present, consumed as a main article of diet in some areas in certain seasons of the year. Its use, however, as a major ingredient in the diet, as a substitute for cereals, is undesirable since it may seriously reduce protein intake. The aim, therefore, should be to increase its production simultaneously with that of other foods richer in protein, such as cereals, pulses and fish.

Tapioca, the area under which has extended very considerably in South-West India during the war, has one serious disadvantage. It is a very poor source of protein. In normal times, therefore, the extension of tapioca growing should be encouraged, only if it is possible to ensure that it does not become the chief ingredient in the diet and that other foods richer in protein are consumed in sufficient quantities.

An increase in the production of plantains and bananas, for consumption as a supplementary food, particularly by children, should be included among the objective of food policy."

Crop planning

250. Extension of irrigation, crop improvement, better tillage and better agronomic practices will collectively contribute to increase the cereal production of the Province. But to improve the quality of the national diet and to provide a balanced diet, it is necessary to readjust the cropping of the Province to provide for the extra milk, fruits and vegetables required. The attainment of qualitative self-sufficiency as has already been noticed, is a complicated problem of increasing the standard of life of the people. The law of supply and demand will make eggs, fish and milk available if there is an effective demand for them. This is not to say, however, that no planning is necessary, but is just to indicate the greater limitations of work in this field. Crop planning for feeding a nation's population is always beset with many difficulties. A change in the national dietary raises problems necessitating re-adjustments in cropping with reference to their agronomic and economic aspect. A ryot is always interested in getting the maximum return from the land he cultivates and his cropping is arranged towards this end. In this, he is guided generally by the suitability of the land for the crop, the seasonal factor, the availability of supplementary irrigation water or otherwise and finally the net profit per acre from the crop. In many cases, however, these considerations do not arise, as for instance, in the large deltaic areas where rice is grown year after year and where alternative cropping is not practicable owing to the unsuitability of the land for any other cultivation, barring some high level well-drained lands which may be fit for crops like sugarcane or plantains. Outside these areas cropping is very much influenced by the factors already indicated above. It is common knowledge that the early or late setting in of the monsoons considerably influences the kind of cropping in the vast dry lands of the Province resulting in a change over from cholam to cotton or groundnut or *vice versa*. Here the cropping is dictated more by the natural laws than by the desires of man.

A quite different cropping system from that followed in the great river irrigations systems is adopted in "garden lands" under well irrigation in some districts. In these areas the assured water-supply, all round the year, from the wells facilitate considerable elasticity in cropping resulting in a variety of crops being grown. All these agronomic aspects apart, the most important is the criterion of comparative profit from various crops. As an instance in point, a pulse crop is a poor yielder, compared to many other cereals and the extra price a ryot gets for a pulse over a cereal is not commensurate with the loss in yield and this has resulted in very poor acreages under pulses in the Province. This can be got over only by suitable price fixation and adjustment making it worthwhile for the ryot to grow certain crops.

251. This apart, the productive efficiency measured in calorie output per acre is bound to be decreased in planning to feed a population with a balanced ration. In other words, much more

land is required to produce a balanced diet with milk and vegetables than a diet based on cereals. It is said that an American requires over 2 acres of crops to feed himself for a year, a German one acre, a Chinese half an acre and a Jap one-fourth acre owing largely due to differences in yield. As a corollary, a change of dietary to a balanced ration will naturally result in an increase in land requirements per individual of the population. This was the experience in the United States of America after the last war. A decrease in the consumption of cereal food per person—wheat flour and corn meal—reduced the areas of these crops needed to feed a person by one-twelfth of an acre, while an increase in the consumption of milk, vegetables, fruits and of meat increased the area needed per person to produce these products by a quarter of an acre. Similarly, in our country a change of dietary will involve an increase in the areas cultivated in which term are included greater output from existing areas also for certain crops. On the American standards, an extra one-sixth of an acre per individual, involves the addition of nearly 10 million acres to the cultivated acreage of the Province.

252. The major deficits for providing a balanced diet are in pulses, vegetables, fruits, milk, fats and oils and meat and fish. The deficit in pulses has to be made up by a sixfold increase. This can be done to some extent by the substitution of the cereal crops with pulse crops as the cereal intake will be proportionately reduced when a balanced ration is used. This again can be done under a system of planned crop production by ear-marking a proportion of the area in each village, in selected tracts, for pulses. Such an adjustment should be graduated by reference to the place at which quantitative cereal increase is being effected, so as not to curtail it in the early stages. Meanwhile the following measures are suggested :—

(1) *Bengalgram.*—The scope for increasing the production of Bengalgram is limited by climatic conditions as this is a crop requiring suitable cold weather, not easily obtainable in this Province. Self-sufficiency cannot, therefore, be obtained in respect of Bengalgram.

(2) *Redgram.*—For increasing the production of redgram in this Province, the following suggestions have been made :—

(i) No person should be allowed to cultivate certain kinds of cotton, tobacco and groundnut (unirrigated) except as a mixed crop with at least one row of a pulse crop.

(ii) The growing of redgram on the bunds of paddy fields should be made compulsory by legislation in areas suitable for the purpose.

(iii) Good seeds should be purchased by the Government and distributed free to ryots who are willing to grow the pulse crop on their lands for the first time.

(3) *Blackgram and greengram.*—Legislation should be introduced to enforce the cultivation of these pulses as a second or a third crop on all wet lands, after the last paddy harvest for the

season is over, reserving, of course, the power to exempt any area which is not suitable for such cultivation, preference being given to blackgram.

(4) *Horsegram.*—The cultivation of horsegram is confined to the poorest classes of dry lands where no other pulse or other crop can grow easily. As it is imported only in small quantities there is no need to expand the area under this crop.

(5) *Minor pulses.*—There is no necessity to incr.ase the area under these pulses.

253. The biggest deficit is in non-leafy and leafy vegetables to the extent of over 3 million tons. The present production of 8 lakhs of tons has to be increased 3½ times. With an average yield of 3 tons per acre this will involve the cultivation of vegetables over an area of one million acres. With a view to increasing the production of vegetables various measures have been taken by the Government under the " Grow More Food " campaign. These are only for the emergency period and have not greatly helped to increase production, excepting those organized for the supply of vegetables to the army. Increase in the individual income of the people will create more demand for vegetables which in turn will stimulate more production and supply. Supply of good vegetable seeds, better and cheaper transport and cold-storage facilities will materially help production and conserve supplies. Propaganda in home kitchen gardening to meet individual family requirements will largely help to improve the position.

254. Another large deficit is in fats and oils to the extent of over 4 lakhs of tons. This deficit can, to some extent, be made up by utilizing all the groundnut produced, within the Province itself. The average annual export of groundnut kernels to other Provinces and foreign countries is 3¾ lakhs of tons equivalent to an oil production of 1½ lakhs of tons. This leaves 2½ lakhs of tons to make up the deficit. This should be made good partly by extra production of groundnut and partly by increasing the supply of animal fats by means of dairying schemes. It will not be difficult to increase the yield of groundnut per acre if more of the groundnut areas are brought under irrigation. This is a better method than extending the groundnut area, as the haulms of the groundnut crop are useful as green manure. Several new groundnut hydrogenation factories are being started in this Province and these will create a demand for groundnut ultimately leading to increased areas being grown with it.

255. Among livestock products, milk, meat and fish account for large deficits. The improvement of cattle and sheep will go a long way to make up this deficit. Plans on the model of the Ongole breeding scheme (see appendix 23) for other breeds of cattle and buffaloes, must be properly worked to make up this deficit. Such schemes have to be prepared early for the Halikar and Kangayam breeds. In addition, district schemes for the improvement and grading of the local types are also necessary. These have been

dealt with in detail in another chapter. Fish opens up perhaps the most promising line of action. Expansion and organization of both deep-sea fishing and of fresh-water fish are immediately necessary. Deep-sea fishing has to be organized by having more trawlers, fishing vessels, cold storage facilities in the ports and facilities for transport inland. Fresh-water fish development has been neglected in the past. Almost any small water course or reservoir can develop fish and the collective effect will be considerable.

CHAPTER VII—LIVESTOCK

Importance of cattle to agriculture in India

256. India possesses the largest cattle population of any country in the world. [1] An estimate of the world's cattle population made in 1930 placed the total at 690 million animals. The total cattle population of India is estimated at 215 millions which is very nearly one-third of the world's cattle population. Two other countries having large cattle populations, the Soviet Union with 65 millions and the United States with 58 millions, have barely one-third of India's total. Great Britain has only seven million animals, one third of the cattle population of Madras. Cattle are required for cultivating our millions of acres, for lifting water from wells and for carrying our produce from field to market. Agriculture in India is mainly dependent on cattle labour. "In most parts of the world cattle are valued for food and for milk; in India, their primary purpose is draught, for the plough or the cart. Without the ox, no cultivation would be possible, without the ox, no produce could be transported." [2] It is thus difficult to place a definite monetary value on cattle labour. Investigations carried out into the cost of cultivation of crops by the Imperial Council of Agricultural Research and similar enquiries in India and elsewhere have shown that between 15 to 25 per cent of the cost of cultivation is contributed by cattle labour. On this basis the share of cattle labour in this Province is Rs. 30 crores. This does not take into account the value of cattle as an important factor in maintaining soil fertility, which will run into several crores of rupees. There is also the income derived from hides and skins, horn and hoof from dead cattle. So far as Madras is concerned, the industry contributes on a very rough estimate, about Rs. 160 crores to agricultural income as indicated below :—

	RS. (IN CRORES)
Cattle labour for cultivation	30
Manure	57
Milk and milk products	58
Road and transport	10
Other purposes	5
Total ..	**160**

[1] Report on the Development of the Cattle and Dairy Industries of India by Dr. N. C. Wright, page 57.

[2] Royal Commission on Agriculture in India, 1928, page 169.

Cattle population in Madras

257. According to the cattle census taken in December 1944, the total cattle population of the Province was 22,644,239 as detailed below :—

Cattle

Males—	
Number of breeding bulls kept for breeding purposes only	91,144
Working bullocks over 3 years	5,648,336
Breeding and working males	842,310
Non-working bulls and bullocks	360,759
Total males ..	6,942,549
Females—	
In milk	1,864,058
Dry cows	2,155,862
Not calved	1,009,593
Cows used for work	584,540
Cows—non-working or non-breeding	193,026
Total females ..	5,807,079
Young stock-males and females	3,605,286
Total ..	16,354,914
Buffaloes—	
Breeding bulls	52,008
Working bullocks	1,010,638
Bulls and bullocks non-working	116,729
Total males ..	1,179,375
She-buffalœs in milk	1,569,658
Dry buffalœs	926,120
Not calved	423,836
Buffalœs used for working	77,160
She-buffalœs over three years not in use for work or breeding purposes	46,053
Total females ..	3,042,827
Young stock—males and females	2,067,123
Total buffalœs ..	6,289,325
Total Bovine stock ..	22,644,239

In addition, the Province has the following other livestock :—

Sheep	10,569,189
Goats	6,087,650
Horses and ponies	50,016
Donkeys	154,534
Mules	259
Camels	119
Pigs	743,754
Total livestock ..	40,249,760

Poor quality of cattle

258. The productive value of the livestock industry in India is, however, not commensurate with its numbers because of the poor quality of the Indian cattle. This is apparent even from a superficial inspection of the village stock, which looks underfed and emaciated. [1] India has as many milch cattle as Europe has including Russia, but the milk production is only one-fifth of that of Europe. Canada has only 6 per cent of India's total milch cattle but has a milk production equal to 25 per cent of India's total. Apart from milk production, poor cattle affect agricultural efficiency. Bad bullocks lead to bad cultivation and poor return. The poor return in turn leads to their neglect by the ryot and the cattle deteriorate further.

Breeds of cattle

259. In spite of the poor cattle owned by the average cultivator, there are in Madras many fine cattle belonging to certain well-recognized breeds. Madras can boast of three good breeds, the Ongoles, the Kangayams and the Alambadis. The Kangayam breed and the herd of the Pattagar of Palayakottai in particular have won all-India fame and they are an outstanding example of careful cattle breeding. The Ongoles and the Alambadis are the result of care bestowed by professional cattle breeders. These professional cattle breeders are gradually disappearing with the diminution of grazing areas which have been brought under cultivation.

The Ongoles

260. The Ongole is a dual purpose animal, being useful both for draught and milk. Its breeding tract consists of the villages lying between the Gundlakama and the Alluru rivers of the Guntur and the Nellore districts, respectively. In and around Kandukur and Addanki, there are a number of cattle breeders, each owning up to 50 head of cattle. There are also breeders with a smaller number of cattle who pay more attention to their stock than the bigger breeders. Grazing is generally found in patta lands which are left fallow but gradually these areas are being brought under cultivation thereby reducing the area available for grazing. The

[1] Report on the marketing of milk in India and Burma, 1941, page 17.

ONGOLE COW

ONGOLE BULL

pastures have good growth of the famous "Chengaligaddi" (*Iseilema Wightii*), one of the best grasses common throughout the Northern Circars. [1] The major portion of the area is heavy black soil. The tenacity and strong bone in the Ongole cattle are attributed to the "Jonna" straw and the lime available in the heavy black soils. The dearth of good breeding bulls and the need to increase their number was pointed out in a survey of the Ongole tract made by the Livestock Officer in 1927. The tract had 93,000 cows at that time with 789 breeding bulls of which 119 were old and useless, thus leaving only 670 fit for breeding. Allowing at least 40 cows to a bull, 1,000 breeding bulls were then necessary for the tract. Several villages had no breeding bulls at all. In the centre of the Ongole tract, the number of cows to each bull worked out to 216. To promote and encourage the breeding of good stock, an annual cattle show was held in the tract from 1858 to 1871. It was re-started in 1904 but was again discontinued. But thanks to the arrangements made by the All India Cattle Show authorities, these annual shows are now being held regularly and are very popular. With a view to improving the Ongole breed by distributing good farm-bred bulls in the Ongole tract, the Government opened in 1918 a cattle farm at Chintaladevi in the Nellore district. The farm was abolished in 1932 as a measure of retrenchment and the stock was transferred to the Lam Farm in the Guntur district. More recently, measures are under way to revive the cattle breeding industry in Ongole on a scientific basis. The present writer has prepared a detailed scheme for the development of this breed. (*See* Appendix 23.) It is now under the consideration of the Government. The scheme has been so prepared as to be applied to any cattle breeding area.

The Kangayams

261. The next important breed of the Province is the "Kangayam", in the southern and south-eastern taluks of the Coimbatore district. The late Pattagar of Palayakottai specialized in this breed. These cattle are purchased by dealers from the neighbouring districts at the breeding centres or at the cattle fairs held at Avanashi and Tiruppur. In this tract, the ryots keep their cows and cattle on their own holdings and many of them have their own bulls. There are black soil tracts in the Kangayam area but the best cattle are found in the "Odai jelly" area, a red loam full of kankar gravel. Such soils are known to be cool and retain moisture, while the calcareous substratum is excellent for the formation of bone. As common grazing grounds are not available, cultivators depend on their own land for grazing and all patta lands are enclosed by fencing. These private pastures are common throughout the tract and the fencing helps in maintaining absolute control over grazing and in limiting the stock which a ryot maintains. The tract is also fortunate in having the famous Kolakkatti grass (*Pennisetum Cenchroides*)

[1] Livestock of Southern India by Captain R. W. Littlewood, page 26.

which is the main stay of the pastures. The Kangayam and the surrounding areas furnish the best example in this Province of mixed farming of a high and efficient type. Well irrigation is common and garden lands are heavily manured and efficiently cultivated. The Kangayam animal is a good worker, has a good constitution and is very hardy. The working period ranges from ten to twelve years. The Kangayam is not a milch breed. The average milk yield ranges from 1,500 to 2,000 lb. The highest yield in the Kangayam breed recorded in the Livestock Research Station, Hosur, is 4,105 lb. during one lactation, with a daily average of 11 lb.

The Alambadis

262. The Alambadis are another good breed of cattle. They are also called the "Mahadeswarabattas" from the market of that name in the Kollegal taluk, where two large cattle fairs are held in February and in October every year in which the cattle exhibited are mostly of this description. Alambadi is the name of a village on the banks of the Cauvery in the Kollegal taluk. The chief habitat of this race of cattle is the Kankanalli taluk of the Bangalore district and the northern taluks of the Coimbatore and the Salem districts. There are large herds in the wild expanse of the forest land which is scarcely fit or has not been taken up for cultivation, and which affords plenty of pasture. The Cauvery river running through the middle of the tract affords the cattle a perennial supply of water in all seasons. Apart from these jungle centres, large herds of this breed are also kept in the villages in which extensive pasture is available. [1] Mr. Littlewood is of opinion that the Alambadis might have some Amrit Mahal and Ongole blood mixed in them. The Alambadis are fairly massive but not fast trotters like the Amrit Mahals. Cattle near Pennagaram and Denkanikota in the Salem district are more compact looking animals and they move much quicker. The Alambadis are poor milkers.

The Hallikars

263. The Hallikar breed is the most important member of the Amrit Mahal cattle of Mysore. [2] Hallikar cattle are to be found in the Tumkur, Hassan and Mysore districts, the chief centres being parts of the Nagamangala, Kunigal and Gubbi taluks. The area is not by any means extensive and the breed is thinly scattered even within these limits. This is attributed to the scarcity of pasture lands. The cattle are mostly homefed and are not maintained in large numbers except by a few breeders in the taluks mentioned. One peculiar point which is highly prized in this variety is the very long back which is supposed to give them greater strength for work. The Hallikar cows are poor milkers, though the milk is rich and sweet with a high percentage of butter fat. They are of high mettle and though mostly homebred, are

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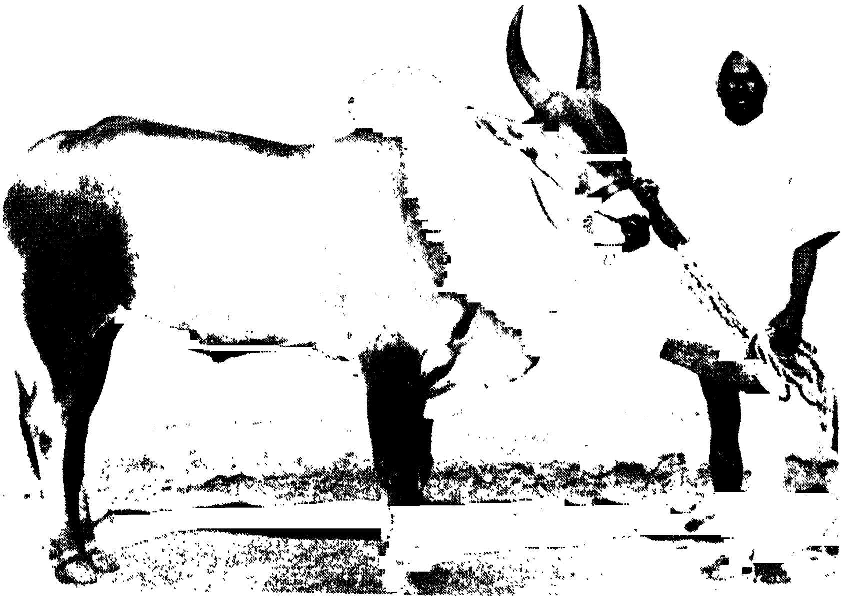
[1] Livestock of Southern India by Captain R. W. Littlewood, page 90.
[2] *Ibid.*, page 80.

KANGAYAM COW



KANGAYAM BREEDING BULL

not gentle or tractable. The Hallikars are now considered to be an important breed for draught purposes and are bred and multiplied at the Hosur Livestock Research Station for distribution in this Province.

Other minor breeds

264. There are several other minor breeds of cattle in the Province found in various districts in small numbers. The Barghur hill breed is found in the Bhavani taluk of the Coimbatore district. They resemble closely the Hallikars or the Mysore breed but are of smaller size, more compact and more attractive. For spirit, power of endurance and speed in trotting, they are unsurpassed. The cows are very poor milkers. Another minor breed is the Pulikulam or Jellicut breed found in the vicinity of the Cumbum valley and the Periar river in the Madura district where there are vast grazing grounds. The cattle are comparatively small in size but are very active and capable of much endurance. In many of the villages in the Madura district these bulls are selected and reared mainly for Jellicut or bull-baiting purposes. In many points they resemble the smaller Kangayam. The cows are poor milkers. In the southern parts of Tanjore are found a type of cattle called the Tanjore polled cattle. Though they do not belong to any specific breed, they are distinctive owing to the early destruction of the horns and the clipping of their ears. Except for the appearance of their heads, these animals have all the chief characteristics of the Kangayam breed. The cows are poor milkers giving only about 6 lb. of milk per day. The West Coast cattle, though not of any particular breed, are a class by themselves. The cows and bullocks are of the small country type and are stunted in growth. A scheme of experiments is in progress at Pattambi in the Malabar district to study the factors responsible for the poor build of these animals

Causes of deterioration

Fodder and grazing problem

265. The most important reason for the deterioration in the quality of cattle is inadequate nutrition. There are too many cattle in the country and the fodder produced is inadequate for their proper feeding. [1] The Royal Commission on Agriculture stated that "no substantial improvement in the way of breeding is possible until the cattle can be better fed." In this Province there are, for every 100 acres of cultivated area, 65 acres of uncultivated land including current fallows. Though this appears large, there is very little grazing available in these areas. Indeed in many parts of the country the weeds growing on cultivated land, the grasses on field borders and along water channels, the cultivated plant which springs up from seeds falling before harvest and the stubble of crops, furnish the main grazing available for cattle.

[1] Report of the Royal Commission on Agriculture in India, 1928, page 201.

[1] Further, there is an abundance of grass only in certain brief periods of the year and except on the common grazing land near the villages where the early grass is devoured by starving animals, the later growth never gets a chance to develop into anything to which the term "pasture" can be applied. Moreover, the growth of grasses is extremely rapid and they quickly become unpalatable to the cattle. If these grasses are cut and stored at the proper stage as hay or ensilage they will provide large quantities of cattle food. But this is often neglected and ensilaging is rarely practised. With the propaganda and the technical help given by the Agricultural Department, ensilaging of grasses is carried on, to a limited extent, in parts of the Province but the quantity so stored is negligible. Thus, compared to the pastures in temperate regions, Indian grass lands are of very little use to the ryots, even when they are readily accessible, not because the grasses are bad but because they are abundant and of high feeding value only for a very short period in the year.

266. The conversion of some of the best grazing lands for cultivation to meet the needs of a growing population has also contributed to a shortage in fodder supplies. In certain cattle-breeding areas the introduction of money crops has resulted in a reduction of area under fodder crops. Mr. Littlewood, a former Deputy Director of Livestock in Madras, has explained how this process is going on in the Ongole breeding tract. [2] He says "to give some idea of the methods of farming in this tract in former days and the present, I have taken a holding of 50 acres. In former years the cropping was 12 acres fodder cholam mixed with gram, 5 acres korra sajja followed by horsegram, 15 acres varagu and pyru jonna, 5 acres pyru jonna, 2 acres maize and 11 acres pasture, the cattle maintained on a holding of this size having been roughly as follows :—

two pairs work cattle,
two or three cows,
two or three buffalœs, and
three calves.

All the fodder would be utilised by the ryot in feeding his stock. At the present time, if we take a holding of this size we find it cropped in this way : 6 acres jonna, 4 acres korra and sajja, 2 acres pillipesara, 15 acres varagu and pyru jonna, 5 acres pyru jonna, 2 acres maize, 10 acres chillies, coriander, tobacco, groundnut, and 6 acres pasture. Of these, practically the whole produce of 10 acres is sold away and the ryot is short of 5 acres of grazing land and 6 acres of fodder crops; this is roughly 50 per cent of his grazing land and 15 per cent of fodder growing land. The ryot does not purchase any fodder to make good the deficiency and hence the quality of the present day stock is not so good as formerly."

[1] Report of the Royal Commission on Agriculture in India, 1928, page 178.
[2] Livestock of Southern India by Captain R. W. Littlewood, pages 28–29.

Forest grazing

267. A considerable portion of the area which is classed as forest is open to grazing either throughout the year or during parts of the year, especially in summer when grazing is required. Grazing in the reserved forest areas has been going on for many years under permits issued by the Forest Department. Several measures were taken to fix the areas and to limit the number of cattle to be admitted for grazing within the reserved forests. In 1895, reserved forests were divided into grazing blocks which in turn were divided into compartments so that some portions might be closed to grazing for a period. A Forest Committee was appointed in 1912 to examine the question of grazing in reserved forests. The Committee recommended a scheme of classification of forests. It also recommended that grazing fees should not be abolished and that goats should be strictly excluded from all reserved forests. It added that blocks intended for the grazing of local or migratory cattle should be carefully fixed with due regard to area and water-supply. As a result of the Committee's recommendations certain forest areas were separated and for such areas, forest panchayats were established. In 1920 there were 336 panchayats. In 1922, these panchayats were transferred to the control of the Revenue department. The transfer of about 3,000 square miles of forests to panchayats did not, however, materially help to improve the position. The block system of grazing was abolished and grazing was allowed over the entire range. Regulated grazing was thus neglected. The Royal Commission on Agriculture which examined the question recommended that the intensity of grazing should be determined consistent with the proper development of the forest and the preservation of desirable grasses. This was not, however, given effect to. Thus the sound policy of controlled grazing laid down nearly 50 years ago has been relaxed in several ways resulting in a more prodigal utilization of grazing grounds.

Grazing systems in Government forests

268. (1) *Permit system.*—At present permits are issued departmentally at nominal rates and are tenable from the 1st July to the 30th June following in respect of a territorial forest division. The rates fixed vary from a minimum of 1½ annas to a maximum of 8 annas per cow unit. There are also several systems of permits on a concessional basis.

(2) *Village system.*—There are two village systems obtaining over limited areas only. These are designed mainly in the interest of protection and conservation of the forests—

(*a*) Under the forest village system, the grazing interest in a specified area is made over to a panchayat with obligation to limit the number of cattle and to protect the area against theft and fire, in return for which it is granted a rebate up to 50 per cent of the fees collected according to the degree of protection afforded.

(*b*) The hill village system is on a similar basis, but the hill-men are granted remission up to the full amount of the grazing fee for satisfactory protection of the forest against theft and fire.

(3) *Kancha system* of Nellore is the most efficient of all grazing systems and it is rendered possible because of the relatively valuable quality of the cattle kept in that division, which require reasonably good grazing. Under this system, specified areas (kanchas) are sold in auction for one or more years to kanchadars who are bound to keep them closed for a certain period after the rains, to limit the number of cattle admitted and to utilise the grazing areas to the best advantage.

(4) The *panchayat* system extends to 3,272 square miles of forests which are leased on a fixed rental to local panchayats who manage them under the supervision of the Revenue Department.

269. The total area of reserved forests in the Madras Province is 18,396 square miles of which 3,272 square miles are under panchayat management and the remainder 15,124 square miles are under the Forest Department. The departmental forest area, excluding the areas closed for grazing, affords facilities for grazing to 1½ million cattle annually. The average incidence of grazing is about 6 acres to a cow unit. The panchayat forests accommodate annually about ¾ million animals and the grazing incidence works out to 2·8 acres per cow unit. With a view to examining the question of grazing in all the principal grazing areas of the Province, a special officer was appointed in 1938. He went into the whole question elaborately, and made concrete suggestions for the improvement of forest grazing by the introduction of the special, the local and the penning block systems of rotational and deferred grazing, cultivation of new varieties of grasses and the supply of drinking water to cattle in grazing areas. He also stressed the necessity for pasture research.

Neglect of livestock by cultivator

270. One of the main factors responsible for the poor quality of our stock is the lack of care of the cattle by the ryot. The general neglect of the cow and her female calf, which are starved from birth, has a very deleterious effect on the breed of the cattle. Fortunately, the draught cattle are not so badly neglected. The ryot is interested mainly in producing male stock as he wants good draught cattle for cultivation. The female stock is generally neglected as the ryot is not interested in producing large quantities of milk which has normally no market in rural areas. The ryot himself is not accustomed to a milk diet and such milk as is produced is converted into ghee and sold, and the buttermilk is used by him. Moreover, the she-buffalo rather than the cow is the milch animal of India. Therefore wherever animals are kept purely for milk production the she-buffalo receives more attention. Its average milk yield is markedly higher than that of the cow, with a higher fat content which in turn gives more ghee. This

apart, the buffaloes have the unique ability to feed on any rough or coarse fodder and assimilate it without affecting milk production. In view of the poor quality of the fodder normally available under village conditions and the hard conditions under which the animals have to live, the hardiness of the she-buffaloes is a most valuable asset to the cultivator.

Too many surplus cattle

271. The presence of a large number of useless and decrepit cattle is partly responsible for the general deterioration in the quality of our cattle. The number of cattle maintained per 100 acres of net sown area in Madras is 69. [1] The corresponding figures for India, Holland and Egypt are 67, 38 and 25, respectively. Holland and Egypt have been chosen because Holland has the largest number of cattle in relation to the size of the country and in Egypt, the number of cattle is very small. The disparity between the Indian and the Egyptian figures is more than apparent when it is remembered that cultivation in Egypt is more intensive requiring more cattle power. In Madras for the total cropped area of 37 million acres 3 ;7 million pairs of cattle are required for cultivation at one pair for every 10 acres, whereas, according to census figures there are only 3¼ million pairs of cattle. The deficit is made up by working cows and buffaloes in their dry period. Besides, there are about 1¼ million carts on the road for agricultural transport. Even granting that transport work is complementary to field cultivation and is carried on in the off season, the actual number of work cattle is barely sufficient to meet the cultivation requirements.

The surplus, therefore, is not among the work cattle but in the other stock. According to the latest census report the total number of cows in milk is 1,864,058 and that of dry cows is 2,155,862. Herein lies the waste of wealth with regard to our livestock. It is notorious that our cows are irregular breeders. The dry period beyond a certain limit is an avoidable waste. It is usual in villages to overlook the ostrum period and the cows do not get served at the proper time and thus the interval between two calvings extends to over a year and in some cases to two years. This increases the number of dry cows in proportion to cows in milk. The cost of feeding during the dry period coupled with the loss of milk is a waste. To add to this, there are large numbers of useless and sterile animals which do not breed at all. There are many others which are diseased and unfit for work. The total number of cows which have not calved and which are not working exceeds a million and there are more than one-third million non-working bulls and bullocks. Among the buffaloes also there is a large number of useless animals.

272. Religious sentiment and social customs have stood in the way of the economic disposal of these cattle, particularly cows and

[1] **Royal Commission on Agriculture in India, 1928, page 188.**

bullocks. This in turn affects the efficient maintenance of the remaining animals. When the fodder supplies available at present are inadequate, it is an economic waste to feed and maintain useless and decrepit animals. Their elimination will result in the better maintenance of the remaining stock. For animals to breed regularly, it is necessary to keep them in good condition with adequate feeding. Otherwise, they do not conceive properly at regular intervals. The dry period is prolonged, the progeny is unhealthy and undersized. The average age of first conception among the common breeds is about the fifth year, whereas in farm-bred animals and in imported stock, heifers become fit for service by the third year. In controlled breeding trials at the Livestock Research Station, Hosur, it has been found possible to reduce the dry period to four months. We have acquired a large cattle population and the animals in many tracts, as in Tanjore and Malabar, are so small and stunted that the task of reversing the process of deterioration and improving the livestock of this Province is now a gigantic one.

Poor breeding stock

273. Scarcity of good breeding stock is also partly responsible for the existing poor condition of our livestock. The breeding operations in this Province are carried on in a variety of ways. There is a class of special and superior bulls of the " Doddadana " breeds which are kept in villages and are free to graze anywhere and move about freely with the village herds. These are generally dedicated to temples. The Doddadanas are selected from the Amrit Mahal, Hallikar, Ongole, Alambadi and kindred breeds. These breeds are generally owned by well-to-do ryots and breeders. There are professional breeders and many of them keep their herd of cows and bulls for breeding purposes mostly in the vicinity of grazing hills and lowland forests. They buy yearling calves from small holders and rear them for sale in pairs. In some villages it is common to subscribe for a superior bull which is carefully selected and purchased when young. Among the better class of animals, great care and attention are bestowed on the selection of both cows and bulls and the conditions under which they are reared afford facilities for the regulation of breeding. Each herd has its own special bull which is often changed to avoid in breeding. In the Ongole breeding tract, the majority of the breeding bulls are the Brahmini bulls. The tradition is that one of the early Hindu Rajas in the course of his travels saw very poor specimens of herd bulls and after considerable thought decreed in honour of Lord Siva and of Nandi, the divine bull, that all well-to-do persons should, on the death of a relative, select the best bull-calf they could find, and present it as an offering to God. Those animals became the property of the community and sires of the village herds. The tradition worked well in the ancient days but gradually people bought cheap young bulls and presented them to the deity to salve their conscience. This accounts for the large number of poor bulls which roam about in the villages now. Another class

of breeding bulls consists of the Nadu bulls. They are the numerous, small sized, and more or less ill-shaped young males of the 'Nadudana' class. They herd with the village cattle, resulting in degenerate breeding. Inferior or defective bulls are never castrated and the common practice of driving all the village cattle, male and female, together in one herd leads to indiscriminate breeding. In the Kangayam tract there are no Brahmini bulls, and the breeding conditions are entirely different. The breeders have large grazing areas of their own and the herds are divided and grazed in different blocks. All breeding bulls are private property and are owned by big breeders, most of whom do not allow the smaller breeders to have their cows served by them unless the offspring is sold to the owner of the bull. In the south, the practice of dedicating bulls to temples is not prevalent to the same extent as in the Ongole tract. The herds are served by young bulls of the village. In the Tanjore delta, big ryots maintain breeding bulls in order to encourage small cattle owners to send their cattle for grazing on their paddy lands for manure. The services of the bulls are free and the ryot with a good bull always attracts the largest number of cows for grazing on his fields.

Communal grazing

274. One of the evils standing in the way of improvement of our cattle is communal grazing, i.e., grazing of cattle on land to which every animal in the village has an actual or accepted right. Where communal grazing is prevalent every ryot in the village claims as large a share of it as possible with the result that grazing lands are always overstocked. Lack of grazing and overstocking result in the deterioration of many animals.

Livestock improvement

Production of adequate fodder and feeds

275. The improvement of livestock has to be brought about by "*better feeding and better breeding.*" No substantial improvement in the way of breeding is possible until the cattle are better fed. It is therefore necessary to find out to what extent the fodder supplies are adequate for our cattle. It is very difficult to estimate the fodder production and the requirements of the cattle population of the Province. On the basis of approximate yields the Provincial Fodder and Grazing Committee has estimated the total fodder production from cultivated crops and pastures of the Province at 32,888,100 tons as follows :—

	IN TONS.
Dry roughage	21,645,600
Bhusa of pulses and miscellaneous green fodder	3,341,700
Natural grass from pastures	7,900,800
	32,888,100
Concentrated feeds	1,918,000
Total ..	34,806,100

Taking the bovine stock at 22,644,239 the fodder available per head of cattle works out to 9 lb. per day. A healthy animal weighing on an average 600 lb. requires for maintenance and normal production 13 lb. of dry roughages and ¾ lb. of concentrates. The fodder produced in the Province is thus not sufficient for the proper feeding of the cattle population.

Apart from the inadequacy of supplies, the distribution of fodder areas and their production are not uniform all over the Province, and there are surplus as well as deficit areas. The Provincial Fodder and Grazing Committee divided the Presidency into five regions or categories of tracts, namely, scarcity areas, deficit areas, areas of satisfactory ration, surplus areas and areas of abundance. The scarcity areas are the regions where there is an absolute scarcity of fodder as for instance, some portions of the Circars and Malabar. The deficit areas are represented by the remaining areas of the Circars, Nellore and portions of North Arcot where also there is a comparative fodder shortage but the position is not so bad as in scarcity areas. Next are the areas of satisfactory ration where the fodder supply is just sufficient to meet the requirements of the cattle in those regions. These include certain taluks in the Circars and the East Coast and portions of the Madura, Tinnevelly, Salem and Coimbatore districts. The surplus areas consist of some taluks in Coimbatore, Madura and Nellore. The areas of abundance include some taluks in the Circars, Nellore and Coimbatore, where the supplies are abundant. The five regions with their cattle population and fodder production are indicated in the following table :—

Description of areas.	Area in acres.	Human population.	Cow units.	Total fodder and concentrates in tons.
(1)	(2)	(3)	(4)	(5)
Scarcity areas ..	15,211,000	8,702,000	6,027,000	3,752,000
Deficit areas ..	26,936,000	15,738,000	11,678,000	9,599,000
Satisfactory ration areas.	22,989,000	15,498,000	9,887,000	11,385,000
Surplus areas ..	7,523,000	3,761,000	3,074,000	3,620,000
Abundant areas ..	7,839,000	4,575,000	2,327,000	6,450,000
Total ..	80,498,000	48,274,000	32,993,000	34,806,000

Note.—The livestock population is indicated as cow units, wherein one cow, two sheep or two goats are considered equivalent to one cow unit.

276. The scarcity and the deficit areas comprise more than half the area of the Province with half the cattle population. The fodder is just sufficient for a satisfactory ration only in 30 per cent of the total area. Even here, the satisfactory balance may be upset by an adverse season. The regions of surplus and abundance constitute only a fraction of the total area of the Province and the cattle population in them is less than one-sixth of the total cattle population of the Province. Neither are these surplus and abundant areas useful to meet the requirements of the scarce or deficit areas, as it is impossible to transport bulky fodder over long distances. Therefore between these three categories which represent 80 per cent of the Presidency area, the fodder supply position cannot be viewed with equanimity.

If the supplies of fodder are inadequate the quality of the fodder judged from its nutritive value is also poor. A substantial portion of the supplies representing 21 million tons is the cereal straw left over after threshing grains. Cereal straw is notorious for its poor nutritive value for growth as well as for milk production. The nutritive ratio (i.e., the ratio between the digestible crude protein and the combined digestible carbohydrates and fats) furnished the index by which the suitability of the various fodders can be judged. For milk production, the nutritive ratio of the ration must not be wider than 1 :10 and the higher the milk yield, the narower must be the ratio. Dry fodder like paddy straw which is abundant in this Province has a nutritive ratio of 1 : 40 and is obviously unsatisfactory for milk production. The other kinds of cereal straw are also comparatively poor, with the possible exception of cholam straw.

277. The problem of increasing fodder production is now attempted to be tackled in two ways, firstly, by the introduction of several useful fodder crops and secondly by the grant of concessions to encourage an extended cultivation of fodder. Several high yielding and nutritious grasses like Guinea grass, Napier grass and Rodehs grass have been introduced. These have nutritive ratios between 1 :12 and 1 :10 and are therefore reasonably good sources of nutrients for milch cattle. Other fodders of outstanding value introduced in the Province are the leguminous fodders such as Lucerne (Alfalfa) and Berseem. The former thrives well in all the districts of the Province and is very popular among ryots. It has a nutritive ratio from 1 : 4 to 1 : 6 and is ideal for milk production. The Government have granted certain concessions to induce the ryots to grow more fodder crops. If cholam is grown for fodder as a subsidiary crop on wet or dry land, no additional water charge is made for the crop. The same facility is extended also to other fodder crops, subject to the condition that they must be cut off or fed off before they set seed and be used for the bona fide requirements of the cultivator himself. There has been an increase in the area under fodder crops as shown below :—

Year.		Acres.	Year.		Acres.
1910–11	..	264.371	1940–41	..	459,455
1920–21	..	298.872	1944–45	..	459,653
1930–31	..	449,865			

Though there is some progress, the problem has not been adequately solved. If under the future planning of agriculture, the productive value of land is increased it will necessarily result in an increased yield of foodgrains per acre. Increase in grain yield will naturally result in an increase of the straw yield. The fodder problem of the cattle is thus correlated to the food problem of the human population.

Conservation of fodder

278. During the many months preceding the monsoon, there is no fresh fodder or herbage available for cattle and the animals have

to subsist on inadequate supplies of coarse dry roughage. If the cultivation of more green fodder crops is resorted to, the need will arise for converting a portion of the produce in a form in which it can be stored for use during the lean months. Ensilaging or hay-making is the only means of conservation. Reasonably good progress has been made by the Agricultural department in populari-izing silage-making in rural areas. In the Coimbatore district, ensilaging of green ragi straw is commonly practised. There is need for more propaganda in this direction as silage is of much potential value for improving the nutrition of cattle. If conservation by ensilaging is found difficult as in some districts, the fodder may be converted into hay easily. The fodder has to be cut at the proper stage of maturity to conserve its maximum feeding value.

Besides increasing the production, there is also the need to use the available supply of fodder to the maximum advantage. It is notorious that our cattle are injudiciously fed. A cow in a village may be fed with roughages alone and a cow in a city with too much of concentrates. It is therefore necessary to educate the cultivator on balanced rations. In order to balance the rations, and to make up the protein deficiency, cattle require some supplementary concentrated feed in addition to the roughages to maintain themselves in good condition. In this Presidency the largest sources of concentrated cattle feed are the oil cakes, and the rice bran obtained in the milling of rice. Cotton seed is also a valuable supplement. In addition there are the bye-products from pulses. Some pulses are directly fed to cattle. The Provincial Fodder and Grazing Committee estimated the total of all these concentrated feeds at 1,918,000 or approximately 2 million tons. This allows a per capita consumption by all the stock (excepting sheep and goats) of a little over ½ lb. per day. Even on the low side, an average minimum requirement of ¾ lb. per day is necessary for increased milk production and for better performance by working bullocks. This means that the present supplies of concentrated feeds must be increased by 50 per cent so as to reach a target of about 3 million tons. [1] Dr. N. C. Wright has stated that the quantities of digestible crude protein available in the country barely balance with the total digestible nutrients. Young stock in particular require large quantities of protein. The requirements of working bullocks in addition to those of milch cattle are also considerable. The problem for the future seems to be the supply of the protein requirements of the livestock. The Madras Province is short of pulses even as food for the human population. Fortunately, it has the largest acreage under groundnuts in India and the oilcakes as a cattle food are an important bye-product of the oil milling industry. The oil milling industry is being rapidly developed and if all the groundnut produced is crushed in the Province itself, it will result in the production of 6 lakhs of tons of cake which can be used for feeding cattle as well as for manuring

[1] Report on the Development of the Cattle and Dairy Industries of India by Dr. N. C. Wright, page 75.

crops. Movements within and without the Presidency of groundnut cake are already controlled and in any future planning the requirements of cake for the livestock industry should be kept in view in rationing exports. An improvement in food production especially of rice will also result in the increased production of rice bran.

Though an animal may be well fed with regard to total nutrients and proteins, it may be underfed in the matter of essential minerals. Until recently, very little attention was paid to the possible existence of mineral and vitamin deficiencies. Investigations made at the Coimbatore Agricultural Research Institute have indicated a wide range of mineral deficiencies in the fodder grown in the different parts of the Presidency, and the need to supplement the cattle ration with calcium and phosphorous. The supplementary feeding of cattle with a mineral mixture is now an accepted practice among advanced agriculturists.

Improved cattle breeding

279. Apart from the fodder problem the inadequacy of good breeding bulls in the country stands also in the way of improvement of livestock. The indiscriminate breeding with Brahmini bulls and scrubs of unknown parentage which is going on now has already been referred to. The need for the distribution of good bulls of known pedigree in adequate numbers was realized early. In 1916, Mr. Stuart, a former Director of Agriculture, proposed a scheme for the distribution of breeding bulls on the Irish model. The essential feature of that system was that the breeding bull was owned by an individual or society but a grant was paid by the Government for a limited period so long as certain conditions were observed. The scheme, called the ' premium ' scheme was approved by the Government in the same year. At the same time, it was realized that before the breeding bulls were distributed, it was necessary to know more about the animals to be distributed, for instance, their pedigree. The need therefore arose for farm-bred animals. In the same year, the Government announced the appointment of a Deputy Director of Agriculture, Livestock, in the Agricultural department. His duties were (1) the establishment and management of stock farms in localities in which good breeds of cattle existed, (2) the preservation in such farms of valuable strains of indigenous cattle and the distribution of good stock therefrom, (3) the formulation of systematic measures to improve the draught and milking qualities of cattle by selection and crossing, and (4) the formation of milk record societies and the investigation of several other problems connected with milk. To implement the first three functions, a stock raising farm for Ongole cattle was established at Chintaladevi in 1919. Another farm for the breeding of buffaloes was opened at Lam near Guntur in 1923 and third for Hallikars and Kangayams at Hosur in 1924. The Hosur Livestock Research Station now serves as the Central Research Station for the improvement of all livestock in the

Province. This farm is the largest and covers 1,660 acres, most of which is pasture land. A large herd of Kangayams and smaller animals of the Scindhi and the Hallikar breeds are maintained on the farm, and the bulls bred here as well as the surplus female stock are distributed to the districts for breeding purposes. The station at Chintaladevi was abolished in 1932 as a measure of retrenchment and the herd of Ongoles maintained there was transferred to the Lam farm where small herds of Ongoles and buffaloes are now kept. These stations carry out research on all livestock problems including an investigation into the possibility of evolving a strain of high-milking cows and serve the purpose of keeping the breeds pure and of supplying a limited number of approved breeding bulls to the districts.

280. On the transfer of the livestock section from the Agricultural to the Veterinary department in 1938, the Director of Veterinary Services was asked to formulate a clear and comprehensive scheme for the improvement of cattle in this Province. He suggested *inter alia* that a Provincial Livestock Improvement Committee might be constituted to consider problems connected with the improvement of livestock and to lay down the broad lines of policy to be followed by the Veterinary department in that direction. The Cattle Conference held at Simla in May 1937 had also previously recommended the establishment of Provincial Livestock Improvement Boards in the Provinces, in order to maintain a sustained effort to improve livestock in India and to maintain a continuity of policy in all livestock breeding. A 'Provincial Livestock Improvement Board ' was accordingly constituted by the Government in February 1940. The functions of the Board are generally to advise the Government on schemes for the improvement of livestock in the Province and to make suggestions for revision of the schemes or policies in force that may be found necessary from time to time and for raising funds for the purpose of financing schemes for the improvement of livestock. In particular the Board is to consider—

(1) scheme for the improvement of the working and milking capacity of cattle in the different districts with particular attention to the three main breeding tracts of Ongoles, Kangayams and Hallikars,

(2) the improvement of the country buffaloes as milch and draught animals and their suitability, size and type for the various districts,

(3) the areas where grading up of local breeds by the use of good bulls is possible and desirable, so that the supply of good cattle within the Province may be augmented, and

(4) schemes for improvement in the breeding of sheep, goats and poultry as a side line to farming.

The Board consists of the Minister in charge of the Veterinary department (Chairman), the Director of Veterinary Services, the Director of Agriculture, the Registrar of Co-operative Societies,

the Principal, Madras Veterinary College, the Livestock Development Officer and six non-official members.

The policy of livestock improvement in this Province is generally based on the following lines :—

(1) distribution of stud bulls according to the needs of the respective areas,

(2) formation of Breed Associations for Ongole, Kangayam, Hallikar and Alambadi areas,

(3) grant of assistance in the form of grants, lease of grazing lands, schemes of water-supply to recognized and approved breeders who produce good types of breeding bulls,

(4) maintenance of nucleus herds of pure bred cattle on Government farms in order to keep the breed pure and of a fixed type,

(5) organization of cattle shows in the breeding tracts with the aid of grants,

(6) survey of principal buffalo breeding areas, and

(7) formation of a Provincial Livestock Improvement Fund.

Distribution of stud bulls

281. According to the 1944 Livestock Census, the total population of cows aged over three years in this Province was 5,029,513. On the basis of one bull for every 100 cows the total number of bulls required for service is 50,295. Allowing a two years' interval between two services for a cow, a bull will have to perform normally 50 services per annum. For she-buffaloes whose total population is 2,919,614, the Province requires 29,196 buffalo bulls on the same basis. The number of approved bulls available for service in 1944–45 was 720, representing only 1½ per cent of the total requirements of bulls. The number of buffalo bulls available for service was equally meagre (241) and this works out to less than one per cent of the total requirements of buffalo bulls.

At present pedigree stocks are available only in Government farms for distribution to ryots, although the stock of the Pattagar of Palayakottai is also used to some extent in the Kangayam breeding tract. As it is not possible for the Government to be in a position to supply even a small proportion of bulls required for the cattle population, it was considered essential that private breeders and corporate and local bodies should be encouraged to maintain as many good bulls at stud as possible, so that the available number of bulls per stud might be augmented. With this object in view, the Government have introduced a number of schemes for the grant of financial aid towards the maintenance of stud bulls. The first was the premium scheme inaugurated in 1916 and the conditions relating to its grant have been varied from time to time. At present, grants not exceeding Rs. 160 per annum (Rs. 70 for services and Rs. 90 for maintenance) for the first year and Rs. 150 per annum (Rs. 60 for services and Rs. 90 for maintenance) for the second and third years are paid to owners of each approved bull maintained at stud subject to certain conditions with regard to maintenance and

the number of cows served. In the case of Ongole bulls and buffalo bulls, the amounts are increased by Rs. 10 per annum. Prizes of Rs. 10 are also distributed in the second and third years to the owners of the two best calves (one heifer calf and one bull calf) born to each bull. The bull will in the first instance be approved by the Livestock Development Officer or the District Veterinary Officer concerned, and it will be inspected by the latter or one of his assistants at least once a quarter. A bull accepted for grant of premium will remain in the scheme for a period not exceeding five years from the date of acceptance or unless it is earlier removed from the scheme for any reason, provided it continues to serve satisfactorily and provided also that the conditions laid down with regard to feeding, management and the number of services are fulfilled and the bull retained at the same station. The bull should not be removed to another station except under the advice or with the approval of the District Veterinary Officer concerned. No individual or institution will ordinarily be allowed to maintain in the premium scheme more than one bull of the same breed or class in one and the same place except in circumstances specially recommended by the District Veterinary Officer concerned. Co-operative societies are encouraged to purchase and maintain stud bulls from their common good fund and the premium scheme has been extended from 1st January 1937 to the bulls so purchased.

282. According to another scheme approved in 1935, the Government have been making grants to district boards for the purchase of stud bulls for distribution among interested ryots, panchayat boards and co-operative societies. In that year, the Coimbatore District Board proposed to purchase 20 breeding bulls every year partly from its own funds and partly with a contribution from the Government. When approving the proposal, the Government stated that they would be prepared to consider similar requests from other districts. Since then, several other district boards like Tanjore, Chingleput, North Arcot, South Arcot, Trichinopoly, Nellore and Bellary have taken advantage of the offer. The bulls to be included in this scheme should be approved by the District Veterinary Officer concerned. They are issued on loan for a period of three years after which they become the property of the custodians. During that period the custodian is responsible for the proper maintenance, care and feeding of the bull. He must see that not less than 60 services are performed annually by the bull and may charge the prescribed fees for service. No premium will be paid by the Veterinary department for the maintenance of the bull.

The third scheme provides for the wider distribution by the Veterinary department among selected breeders of adult and young bulls for stud purposes. In May 1941 the Director of Veterinary Services proposed to purchase 110 adult bulls of the Kangayam, Scindhi, Ongole and Hallikar breeds and 85 young bulls (including Murrah buffaloes) and distribute them to selected breeders. Breeders of young bulls were to be paid a subsidy of Rs. 50 a year

for rearing the bulls for a period of two years or until they commenced serving whichever was earlier. As there was a good demand for buffalo bulls, the Director also wanted to purchase 50 young Murrah buffalo bulls, rear them at one of the Government Livestock farms and to sell them after about 1½ years to ryots in buffalo breeding areas for improving local buffaloes. These proposals were approved by the Government and the sum of Rs. 50,000 set apart from the Government of India's grant for rural development to form the nucleus of the Provincial Livestock Improvement Fund was utilized for the purpose. After the Government of India grant was fully spent the Madras Government considered it desirable that the livestock improvement work initiated with the aid of that grant should be continued. Accordingly the Government have been providing every year since 1942–43 a sum of Rs. 20,000 for the purchase of adult and young bulls for distribution to approved ryots and breeders on conditions similar to those applicable to bulls distributed under the district boards' scheme.

In order to ensure that there is an adequate number of breeding bulls in the Ongole tract, the Veterinary department has been authorized to purchase 50 yearling Ongole bull calves every second year beginning from 1944–45. These bull calves will be reared for two years or till they attain maturity, whichever is earlier, at the Livestock Research Station, Lam, Guntur district, and then disposed of for breeding purposes, either by sale to interested ryots or to local bodies which may undertake livestock improvement schemes or by stationing them at Government Veterinary institutions.

283. Besides the schemes referred to above, stud bulls are stationed at Veterinary institutions and jails. The actual improvement effected by the distribution of approved bulls for stud purposes has been very marked, though in the absence of a system of registration, no measure of the progress achieved is possible. [1]Dr. Wright has stated that " it was indeed apparent to me during my tour that in those areas in which pedigree or approved bulls had been placed, the stocks were invariably of an improved physique and appeared to be better cared for." But the improvement of the vast cattle population of the Province still continues to be a major problem to be solved, on account of the paucity in the number of approved bulls available for service. What is required is a sustained drive towards increasing the number of breeding stock. A plan has been prepared for intensive production of the Ongole breed with a target of 100,000 Ongole bulls and 100,000 Ongole cows every year (*See* Appendix 23). Similar plans will have to be drawn up for other breeds like the Kangayam and the Hallikar.

Breed associations

284. In 1939, the Animal Husbandry wing of the Board of Agriculture and Animal Husbandry recommended the formation of

[1] Report on the Development of the Cattle and Dairy Industries of India by Dr. N. C. Wright, page 62.

breed societies for the various cattle breeds with a subsidy from the Government. The recommendation was commended by the Imperial Council of Agricultural Research for consideration by the Provincial Governments. In Madras, the Provincial Livestock Improvement Board agreed to the suggestion for the formation of Breed Associations for the Ongoles, the Kangayams and the Hallikars. Later, however, the formation of a Breed Association for the Ongoles was deferred and steps were taken for the formation of an association for the Kangayam area. After getting the breed characteristics of the Kangayams fixed and approved by the Imperial Council of Agricultural Research the Government sanctioned in 1944 a scheme for the formation of the Kangayam Cattle Breeding and Marketing Co-operative Society in the Coimbatore district. The headquarters of the society was first fixed at Tiruppur and subsequently shifted to Coimbatore. The objects of the society are—

(1) to bring together all the breeders of Kangayam cattle for an exchange of ideas on the improvement of cattle;

(2) to register and mark all pure bred cattle which conform to the type laid down and approved by the Imperial Council of Agricultural Research; and

(3) to place the breeding of Kangayam cattle on approved lines of livestock improvement.

The society will—

(1) prepare and maintain authentic records of all breeding operations such as services, births and deaths of the cattle of its members;

(2) introduce and maintain stud bulls of known pedigree for the use of the cows of its members;

(3) register and mark all pure bred cattle of this breed which conform to the type laid down and approved by the Imperial Council of Agricultural Research;

(4) record all sales or transfers of ownership of registered cattle;

(5) arrange to interchange prepotent animals from one centre to another when found necessary; and

(6) arrange to sell the cattle of members in the best market.

The society will obtain funds by levying an entrance fee of Rs. 2 and an annual subscription of Re. 1 per member. It will also collect from the members 5 per cent of the amount realized on sale transactions of livestock done through the society. The receipts accruing from the scheme will be credited to the Government as departmental receipts. The Government have agreed to subsidize the scheme for a period of 5 years and have sanctioned one Veterinary Assistant Surgeon, two stockmen compounders and one peon. The Government have also agreed to meet an expenditure not exceeding Rs. 2,500 during 1944–45 and an expenditure not exceeding Rs. 600 in each of the four subsequent years from 1945–46 to 1948–49.

Provincial Livestock Improvement Fund

285. In connection with the appeal issued by His Excellency the Viceroy (Lord Linlithgow) for donation of bulls and funds for improvement of livestock in India, the Advisory Board of the Imperial Council of Agricultural Research recommended in July 1936, that it was necessary to establish definite funds for the maintenance of breeding bulls, the proceeds of which could be devoted partly to the purchase of bulls and partly to their maintenance. The Livestock Improvement Sub-Committee of the Animal Husbandry wing of the Board of Agriculture and Animal Husbandry then suggested that no bull should be accepted as a gift unless it was accompanied by suitable provision for maintenance. The cattle Conference held in Simla in 1937 also recommended the establishment of a permanent fund. These recommendations emphasized the need for a permanent fund controlled by a suitable permanent organization which would see that the money available was utilized to the best possible advantage and which should perhaps be largely non-official in character. The Government of India then agreed to set apart Rs. 50,000 from their rural development grant as a nucleus for the Livestock Improvement Fund in this Province to which were to be added private donations and other moneys received from the public. As already stated the initial grant was expended for the purchase and distribution of breeding bulls and young bulls and the Madras Government are now annually contributing a sum of Rs. 23,000 to the fund which is being utilized for the same purpose and also for the holding of cattle shows. But the response from the public has not been very encouraging. Only a small amount (Rs. 3,177) was collected at first and subsequently there has been no enthusiasm. The appeal for funds and donation of bulls has to be continuously made and interest sustained by regular propaganda. Money may be raised by the levy of a small fee on all animals brought to cattle fairs and shows for sale or taken to the licensed slaughter houses for slaughter. Necessary legislation should be passed to give effect to this suggestion. This will provide a permanent source of revenue to the Provincial Livestock Improvement Fund.

Livestock Improvement Act, 1940

286. The problem of livestock improvement in the Province is directly related to the elimination of scrub bulls in the villages and the prevention of indiscriminate breeding by them. The compulsory castration of the undesirable scrub bulls is, therefore, necessarily the first step to be taken in livestock improvement. Simultaneously, the bulls which are considered fit for service should be licensed to prevent the use of scrub animals despite the provision for compulsory castration. To provide for all these objects, the Madras Livestock Improvement Act was passed on the 3rd September 1940. The main provisions of the Act are—

(*a*) No person can keep, without a licence from the Director of Veterinary Services or his authorized officers, a bull that has

cut two permanent incisor teeth unless it has been effectively castrated. No fee will be charged for such licence.

(b) A licence will not be granted if a bull is defective in conformation or in constitution due to disease or if it belongs to a breed not suited to the area.

(c) Compulsory castration of undesirable bulls can be ordered by the licensing officer, such castrations being performed free of charge.

(d) The licence will be checked from time to time by officers of the Veterinary, Agricultural and Revenue departments.

(e) The licence should be produced before a cow is served by a bull on demand by the person in charge of the cow.

(f) Failure to abide by any of the above conditions is punishable under the Act with fine which may extend to Rs. 50 for the first offence and Rs. 100 for subsequent offences.

(g) Unclaimed bulls can be ordered by a licensing officer to be seized, castrated and sent to an infirmary or Pinjrapole or even auctioned.

(h) Nothing contained in the Act shall apply to a bull dedicated to a religious purpose but notice of such dedication should be given to the licensing officer.

Before the Act can be enforced in any area it is necessary to assure a sufficient number of good breeding bulls to serve the cow population so as to prevent a serious shortage of bulls consequent on the elimination of scrubs. To begin with, the Act has been extended to the Kangayam breeding tract, viz., the Pollachi and Erode taluks of the Coimbatore district and the Periyakulam taluk in the Madura district. A well-planned scheme for developing the breeds suitable to an area and the elimination of scrub have to proceed side by side.

The Dairy industry

287. Milk contains all the nutrients required for the human system in a reasonably digestible form. A " protective food " like milk is a necessary supplement to the rice diet of the Province. But the consumption per capita is very low and a large percentage of the population go without milk. Dairying is not an organized industry in this Province. Milk production is generally a rural industry and the bulk of the milk is produced and consumed in the villages themselves. The cultivators, whose main occupation is agriculture, keep an animal or two partly to meet their domestic requirements of milk and partly to supplement their income by the sale of ghee. In cities and around towns a very large number of individual milkmen maintain two or three cows and sell the milk to the townfolk. The animals kept for milk production consist of cows, buffaloes and goats. According to the livestock census of 1944, the number of milch animals in the Province was 5,029,513 cows, 2,919,614 she-buffaloes and 3,639,043 goats. In other words, for every 100 of population there are 16 milch cattle (cows and buffaloes only) or one animal for every six persons. In England there is one cow for every 14 persons. The comparison is, however,

not in our favour, as the productive capacity of the cow is the main factor. The average milk yield of a cow in England is ten times the average milk yield of a cow in Madras. In fact, the Madras yield is about the lowest in the world.

Milk yield of cows in important countries of the world.

Country.	Approximate milk yield of a cow in one lactation.	Country.	Approximate milk yield of a cow in one lactation.
	LB.		LB.
Netherlands ..	7,559	United States of America.	4,126
Denmark	7,005		
Switzerland ..	6,498	Australia	3,463
England and Wales.	5,576	Canada	3,195
Japan	5,857	India	753
Germany	5,305	Madras	532
New Zealand ..	5.118		

Madras has 11 per cent of the total number of milch cows in India and 11 per cent of the total number of buffaloes. In the distribution of milch stock, the largest number is found in Guntur, Vizagapatam, Nellore, South Arcot, Chittoor, Salem and Tanjore, each having nearly half a million animals. Another peculiarity in the distribution of milch cattle in this Province is their extraordinary concentration in big cities. This is due to difficulties involved in handling milk under tropical conditions and the special problems of transport of milk from distant centres. Approximately 6 per cent of the total milch stock of the country are maintained in urban areas.

Milch cattle, their breeds and improvement

288. Barring the Ongoles, there are really no good milking breeds of cattle in the Madras Presidency. This is partly due to the fact that among the agricultural population in rural areas milk as such is seldom used as an article of diet. Outside Government farms very little effort has been made to improve the milk breeds. The few places in the Province where any real effort is made to rear milch cows are in the Ongole tract and in the extreme south. The women of the " Mala " caste in the Tungtoor area of the Ongole taluk rear cows as a special side line, as also the womenfolk around Virudhunagar and Sattur in the Ramnad district. These women rear heifer calves with considerable care and attention and sell the cows in the market. Some of the best yielding animals are retained to keep the strain, though no effort is made to get good bulls to serve these heifers. In other parts of the Province supplies of milch cattle are obtained from their respective local stocks.

In recent years there has been an increasing demand for milk with the raising of the standard of living of the people. The tea

and coffee drinking habit has developed very rapidly in all the districts. The supply of milk to cities has always been a problem. It drains the villages of their supplies of milch animals. Fancy prices are paid for good milch cows by milkmen and taken to cities. The animals are well cared for only to the end of their lactation period and afterwards they are often neglected or sold to the butcher. The calves are rarely looked after. The export of Ongole cows to Madras City is one such instance and Mr. Littlewood, a former Livestock Development Officer, estimated that about 2,500 cows were brought annually from the Ongole breeding tracts to Madras City of which about 1,500 cows were slaughtered and never returned to their native homes [1]. The practice has resulted in a gradual deterioration of the good milch breeds of the Province.

By far the best milch breed of cattle in the Province are the Ongoles. The Ongole cows kept in Madras City yield on an average 2,500 lb. of milk per head per lactation. At the Chintaladevi Livestock Research Station, 39 Ongole cows gave on the average 3,378 lb. of milk and 12 of them gave over 4,000 lb. of milk in a lactation. In the course of an enquiry conducted in 1939 by the Imperial Council of Agricultural Research in the Ongole tract the milk yields of 610 cows were recorded for seven consecutive days. The approximate stage and average length of the lactation period were estimated and the daily and lactation yields per cow found to be as follows :—

Milk yield per day	4·64 lb.
Length of lactation	9·54 months.
Lactational yield	1,236 lb.

Thus the average milk yield in the tract is considerably lower than the milk yields of farm bred animals. This conclusively shows how far selective breeding and proper feeding can increase the milk production in the Ongole breed.

289. The Kangayams are the next most important breed of the Presidency but they are comparatively poor milkers. " Kangayam breed is not a milch breed " but even among them we come across some cows which have given substantially good yields of milk. [2] The average yield of the foundation stock in the Hosur farm was 1,493 lb. and the average of farm bred animals was gradually raised to 1,615 lb. Thus there is a possibility of obtaining a foundation stock of good milch animals if a proper search is made and of building a milch breed on this foundation stock. A scheme is already in operation towards this end at Palayakottai since 1942. The object of the scheme is to improve by selective breeding and proper feeding the milking qualities of the Kangayam cows without impairing the draught qualities of the male animals. Sixty heifers and cows have been selected for the experiment and various methods of improving the milk yield by feeding and management are tried. Two cows have already yielded over 4,000 lb. in one lactation 3 over 3,000 lb. and 10 over 2,000 lb.

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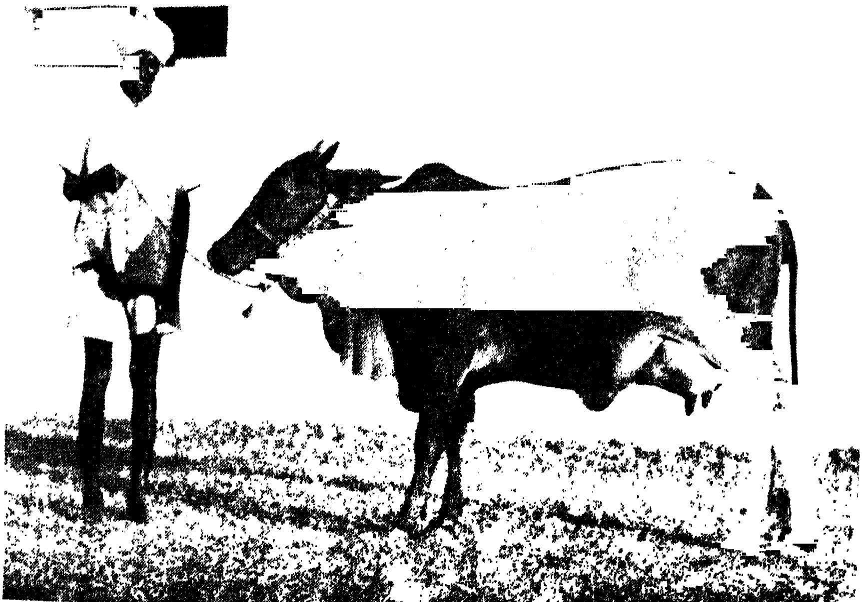
[1] Livestock of Southern India by Captain R. W. Littlewood, page 178.
[2] *Ibid.*, page 68.

SCINDHI BREEDING BULL



SCINDHI COW

290. In view of the dearth of good breeds of milch cattle in the Province, attempts were made to import them from other Provinces. One such breed is the Scindhi. [1]This breed is " one of the purest and most distinct of Indian breeds of cattle and the only breed of commercially profitable dairy cattle in the country outside of buffaloes." It is a dual purpose breed; the females are used for milk production and bullocks are engaged in the carting traffic in Karachi. The Livestock Department is building up a herd of Scindhi cows with the object of producing a herd of very good milkers for urban milk supply. The milk yield of farm bred animals at the Livestock Research Station, Hosur, has averaged 4,137 lb. with a daily average of nearly 12 lb. A few cows have yielded over 6,000 lb. in a lactation. The Scindhi cow is small and nearer our local stock and easily maintained. It thrives well under the conditions prevalent in the Madras Province and hence a large number of bulls of the Scindhi breed has been distributed all over the Presidency. Graded stock with Scindhi bulls has shown considerable improvement over the scrubs and a very good progeny has been built up. Grading of local stock with Scindhi bulls is successfully followed in the Anamalais for the supply of milk among estate labourers.

Cross-breeding

291. The relatively low milk yields of the indigenous breeds and the requirements of the town dairyman for a good milch cow for his business led to early attempts at cross breeding with sires of high yielding European breeds in order to raise the productivity of the local stock. An experiment in cross breeding was commenced in 1919 at the Military Dairy farm at Bangalore. Early in 1923, the Madras Government acquired a foundation stock of cross-bred animals from the military dairy farm and continued the work on the Hosur Cattle Farm. The result of such crossing in the first generation were very striking. The half-bred gave on an average nearly double the yield of the indigenous dam, and there was also better regularity in breeding. The first generation of F-1s when again crossed with F-1s resulted in F-2s and so on. The results of such crossing in subsequent generations, were not however, so very satisfactory. Considerable selection had to be made to obtain types and the percentage of " culls " was generally high. This resulted in high cost in selection and breeding. It was also noticed that the milk yields of the second and third generation of cows gradually went down and the animals also became reduced in size in subsequent generations. [2]The following were the milk yields of the cross breeds compared with Scindhis:—

Average daily yield in lb.			Average daily yield in lb.		
Scindh cows	..	7·2	F-2 cows	..	10·5
F-1 cows	..	12·7	F-3 cows	..	10·4

[1] Livestock of Southern India by Captain R. W. Littlewood, page 113.
[2] *Ibid.*, page 125.

Apart from the degeneration of the stock another result of forward crossing was the high mortality among calves due to their bad physique and various diseases. Out of 222 calves born at the Hosur cattle farm during the course of these cross-breeding experiments, 106 calves or nearly one-half died due to various causes[1]. This difficulty was however got over in the later stages by improved technique in calf rearing. But the fact remains that the cross-bred calves require more attention than the indigenous ones. On the whole crossing with exotic breeds has not proved a success under our conditions. While this is so even under the controlled conditions in Government breeding farms, in many places where cross breeding has been attempted without such controls, the results have frequently been disastrous. [2] Dr. Wright concluded that however valuable cross breeding may be in herds which are under expert control, the general adoption of a policy of cross breeding to improve the yields of country stock would be fatal to the development of sound dairying in India. Therefore, the future line of action for the production of animals of satisfactory milking capacity lies in the careful selection of strains from the indigenous breeds of our own cattle. Substantial improvement has been achieved in some of the local breeds. The improved performances of the Schindi and Ongole farm bred animals have already been alluded to. In some cases, the improvement has been so phenominal that the yields are comparable with those of average European stock. The policy of encouraging the breeding of indigenous stock in preference to cross breeding has been strongly advocated in other tropical countries by Dr. Hammond in Jamaica and Mr. Stockdale in Nigeria. But improvement by selective breeding is necessarily a slow process. Given proper impetus through a scheme like the one already envisaged for Ongole cattle, it should not be difficult to build up a sufficient number of good milch stock to meet the requirements of our Province.

Buffaloes

292. Buffaloes play an important role in the supply of milk in India. [3] The Royal Commission on Agriculture stated that " it is the number of she-buffaloes, not the number of cows, that has to be taken into account when seeking an index of the milk production of a Province. Wherever an important market for ghee exists, it is the she-buffalo which mainly supplies it." In Madras, she-buffaloes represent three-fifths of the total number of cows but provide more than half the total milk supply. Out of a total production of 56 million maunds of milk 28 million maunds are obtained from buffaloes and about 27 million maunds from cows and a small quantity from goats. The popularity of the she-buffalo

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[1] Livestock of Southern India by Captain R. W. Littlewood, page 123.

[2] Report on the Development of the Cattle and Dairy Industries of India by Dr. N. C. Wright, page 68.

[3] Royal Commission on Agriculture in India, 1928 (Abridged Report), page 184.

is easily explained. The milk yield is generally high as seen from village enquiries in the Ongole tract.

	Cow.	She-buffalo.
Milk yield per day	4·64 lb.	6·53 lb.
Length of lactation	9·54 months.	11·30 months.
Lactational yield	1,236 lb.	1,903 lb.

The butter-fat content is also high, averaging between 7 and 9 per cent as compared with that of cow's milk which is between 4 and 5 per cent. The buffalo is the most economic producer of milk and has the remarkable ability of living on coarse fodders. In any well-planned scheme of milk production in this country the buffalo will necessarily play an important part.

Buffaloes are found all over the Province. The largest number is found in the Guntur district followed closely by Kistna. The Circars generally have a larger number of buffaloes than any other part of the Province. Another region where they are found in large numbers are in the Tanjore and Trichinopoly districts. It is generally observed that there is wide disparity in numbers of male and female stocks in the various districts of the Province, dominance of the one or the other depending upon their utility. The male stock is proportionately high in Malabar where they are put to work in wet land cultivation whereas the female stock is very high in Coimbatore where they are maintained for milk production. The wide disparity between male and female population of buffaloes in the districts shows that there are very large extra district movements, the bulk of the males finding their way for work to wet land areas. The buffalo is a much more powerful draught animal for its size than the bullock but is much slower and is often used for heavy draught over short distances. The best male buffaloes are seen in the northern districts of Ganjam and Vizagapatam where ryots pay considerable attention to the breeding and rearing of the male. There are three distinct strains of buffaloes in the Province, the Toda buffalo, the Parlakimedis and the South Kanaras. The Toda buffaloes of the Nilgiris differ from those generally met with in the plains. They are strong, sturdy and powerfully built. They are generally good milkers yielding daily from 10 to 20 lb. of rich milk. The Parlakimedis are the only really useful general purpose breed in the Presidency. The males are good workers in the field. They are better milkers than the ordinary country types, the milk yield averaging about 2,500 lb. per lactation. In South Kanara, there is a hardy breed of buffaloes kept by a sect of Jain Bants. These are reasonably good animals and are put to work in the wet lands of that district.

With a view to improving the local breeds, a Delhi breed of buffaloes was stationed at the Agricultural College dairy at Coimbatore from 1917. As a result the local breed of buffaloes for a radius of 10 to 15 miles was improved both in regard to milk yield and size. In 1923, a buffalo breeding station was opened by the Agricultural Department at Lam near Guntur and the few buffaloes of Delhi and half-bred Delhi buffaloes at the Agricultural College

were transferred there. At that station, pure Delhi buffaloes were used to grade up local herds. The average yield of Delhi or Murrah buffalo in the station was 4,800 lb. milk per lactation. The highest recorded yield was 9,610 lb. per lactation with a daily average of 18.9 lb.

The better breeding of buffaloes and the grading up of the local stock with Delhi buffaloes will go a long way to solve the milk problem of the Province.

Milk recording

293. The establishment of herd books and a system of milk records are essential steps to be taken in the development of high milking strains of Indian breeds of cattle. It is possible to judge the merits of an animal for draught purposes by its conformation and performance. But in the case of milch cattle, conformation is only one indication of milking capacity and performance can be judged only from carefully kept records. Preliminary steps in this direction have already been taken by the Imperial Council in Agricultural Research and information is being collected which will enable the characteristics of the seven chief milking breeds to be defined. The breeds so far included are the Satriwal, Scindhi, Tharparker, Hariana, Gir and Ongole and the Murrah buffalo. The introduction of herd books will provide a most useful index of progress in the breeding of milking types and furnish valuable information for future investigation into the factors affecting the yield and quality of milk. At the instance of the Provincial Livestock Improvement Board, the Registrar of Co-operative Societies submitted a scheme in 1942 for the grant of a subsidy to milk supply societies and unions for the payment of an allowance to their clerks to maintain correct and accurate recording of milk and for the award of prizes for cows whose record of milk was good. The Government sanctioned the scheme for a period of one year. It is being worked by the milk supply unions at Tanjore and Chittoor on the following lines. Only good milkers owned by the members are brought under the scheme. One cow which is a poor milker is also included in order to bring home to the milkmen the need for improved feeding with reference to the data arrived at in the milk records. All these animals are milked twice daily in the presence of the milk recorder who is a clerk of the society. After the milking is completed, the milk is filtered and measured out in standard measures. The yield so obtained is recorded both morning and evening datewar in a milk record register. On the last day of the month the total yield for the month is struck and carried over for the succeeding month. A "pedigree register" is also maintained showing the name of the owner, the breed of cattle, date of calving or purchase, age, colour, identification number, date of service and particulars of the bull, date of going dry, the total quantity of milk yielded during the lactation, description of the progeny and how it is disposed of. The scheme has been continued till 1st March 1948 and also extended to the co-operative milk supply unions at Coimbatore, Madura and Vellore.

Salvage of dry cows

294. Reference has already been made to the practice of milkmen in towns neglecting or selling for slaughter good milch cattle when they go dry. To prevent this economic waste, the Government of Madras have sanctioned a scheme for the salvage of dry cows in the City of Madras. The scheme provides for the reception of cows after their lactation period is over, and their maintenance in a grazing area within easy reach of Madras, where they are taken care of until they calve. After calving the cows are returned to their owners. The area selected lies in the Kambakkam Reserve Forest, in the Ponneri taluk of the Chingleput district. It is situated at a distance of about 54 miles by road from Madras. The Kancha is about 1,700 acres in extent with adequate water-supply. The admission of cows into the scheme is made through a co-operative society specially registered for the purpose. The cows are collected in a depot in Madras, protected against rinderpest and kept under observation for a week before despatch. A fee of Rs. 5 per mensem per cow is levied. Scindhi and Ongole stud bulls are stationed at the Kancha for service of the cows. The problem of salvage of dry cows is not acute in other towns of the Province as in Madras. At Madura, however, salvage of dry cows is being carried on by the Madura Milk Supply Union in an informal way.

Rearing of calves

295. Experience of cattle improvement has shown that the mere provision of a good bull is not enough to effect lasting results. The progeny must be well cared for and the policy of breeding from good bulls and the proper care of the offspring must go on uninterruptedly from generation to generation. The progeny of the approved breeding bulls at stud in the various schemes in vogue in this Province are promising but greater interest should be evinced by the ryots in rearing them, especially the female stock, up to maturity. Alongside of good breeding, good feeding is essential if good healthy cattle are to be produced. In the Punjab a scheme to subsidise 125 of the best selected Dhanm heifers at the rate of Rs. 2 per mensem has been in operation from 1937–38. The object of the scheme is to improve the condition of the female stock which had till then remained somewhat neglected, underfed and stunted. It is stated that the propaganda value of the scheme is enormous and that it has brought about an appreciable improvement in the female stock of the Dhanm breed. A similar scheme was sanctioned in this Province from 1943–44. The scheme was introduced in select area in the Ongole tract. To begin with, 50 selected young heifers of the Ongole breed were brought under the scheme in the first year and a subsidy of Rs. 2 per month was granted to the owner of each animal for a period of two years. It is expected that this would encourage the ryots to pay more attention to the rearing of the female stock until they reach maturity, and incidentally help the propaganda carried on by the Veterinary

Department to bring home to the ryots the importance of better feeding of livestock in general. In order to make the scheme a success the calves will be inspected monthly by the departmental officers and the subsidy will be paid only if the calves are found to be well cared for. In view of the high cost of feeding stuffs, the subsidy of Rs. 2 has now been increased to Rs. 4 a month per calf. The scheme has also been extended further in the Ongole area. The extension of the scheme to the Kangayam and Hallikar areas has also been sanctioned. Another scheme has been introduced in Madras City from 1st April 1945 to encourage owners of cows and she-buffaloes to rear their calves better by granting them a subsidy. The mortality among calves in Madras is high due to the lack of facilities for rearing them as well as to lack of interest taken in their welfare by the cow owners many of whom are professional milkmen. As most of the calves are the progeny of good quality milch cattle, it is very desirable that more attention should be paid to the rearing of these calves. According to the scheme, a subsidy of Rs. 35 per calf is payable to persons who own 10 or more cows or she-buffaloes. The subsidy will be confined to pure bred Ongole calves (both male and female) and to the female calves of other cows and buffaloes.

Milk and dairy products

296. The important dairy products of this Province are milk, ghee and curd. The annual production of milk in the Province is estimated at 568 lakhs of maunds (one maund = 82-2/7 lb.) which is 9 per cent of the total production of milk in India. This is composed of 274 lakhs of maunds of milk obtained from cows, 279 lakhs of maunds from buffaloes and 15 lakhs of maunds from goats. Though milk is produced all over the Presidency there are notable variations in the quantity of output in the different districts. If the unit of area to compute production is taken as an acre, it is found that milk production is 580 lb. per acre per annum in Madras City. This is nothing unusual as there is a large population in the City for whose requirements a large number of milch animals is concentrated in one locality. Outside Madras City, the largest output of milk is in the Kistna and Guntur districts where it is 137 lb. per acre. The region consisting of Nellore, Chingleput, Chittoor, North Arcot and South Arcot districts has an output of 63 lb. per acre. The smallest production is 23 lb. per acre in the Tanjore, Malabar, South Kanara and the Nilgiri districts. This is a very unhappy situation when it is remembered that Tanjore and Malabar are very densely populated.

The milk produced is consumed in various ways in the Province. About 28 per cent of the total production of milk in India is consumed as fluid milk. This is approximately one-fourth of the total supply of cows' and buffaloes' milk but taking into consideration only cows' milk, nearly one half of it is consumed as fluid milk. Buffalo milk is largely used for making milk products. In Madras,

the milk produced is consumed as such or converted into ghee or curd.

Utilization of milk in the Madras Province

——	Annual quantity (in lakhs of maunds).	Percentage to total production.	Percentage to total quantity converted into products.
Consumed as fluid ..	165·00	32·00	..
Converted into ghee ..	267·00	52·00	76·47
„ curd ..	77·00	15·00	22·06
„ butter ..	3·00	0·60	0·88
„ khoa ..	1·00	0·20	0·29
„ ice cream.	0·75	0·15	0·22
„ cream ..	0·25	0·05	0·08
Total ..	514·00	100·00	100·00

These figures clearly indicate the importance attached to ghee in this Province.

Consumption of milk

297. It is in the urban areas of the Province that an effective demand for milk and milk products exists. Though 94 per cent of the milch cattle are found in rural areas and 85 per cent of the population live in them, the demand for milk in these areas is relatively poor. Many of the consumers in rural areas are themselves producers while a vast majority are too poor to buy any milk. Even in the Ongole tract where there is a high intensity of milk production, there are several families who do not consume milk or milk products. Naturally, the conditions existing in the other parts of the Presidency must be worse in regard to purchase and consumption of milk among the poorer population. The main factors which influence urban demand for milk are (1) the availability of milk, (2) the income of the people and (3) the price of milk. In an average family the consumption of milk varies from 1 lb. to 16 lb. depending on the income.

Income range per month.	Quantity consumed per day by a normal family of 5 or 6 persons. IN LB.
Between Rs. 30 and Rs. 50	1
„ Rs. 51 and Rs. 100	2
„ Rs. 101 and Rs. 200	3
„ Rs. 201 and Rs. 500	6
„ Rs. 501 and Rs. 1,000	10
Above Rs. 1,000	16

A substantial portion of the population is poor and in consequence the consumption of milk is very low. Another reason for non-consumption of milk in larger quantities even among producers is due to the ignorance of the rural population regarding the utility

of milk as a nutritive food. They need to be educated in this direction. Directly connected with the purchasing power is the price of the commodity. In many families, the quantity consumed has now been halved due to increase in the price, which is nearly twice the pre-war price. Many families in the small income groups can only afford to make a fixed allotment towards milk. Therefore when the prices go up, smaller quantities are consumed. Milk in villages is cheaper than in cities.

298. The price of milk in normal times in certain centres in India, in England and United States of America is compared below :—

Name of country.	Price of milk per lb. RS.	A.	P.
United State of America	0	2	2
England	0	2	5
Bombay (pasturised)	0	2	10
Delhi	0	2	6
Calcutta	0	2	0
Madras	0	1	8

The average daily per capita consumption of milk including milk products for the Province stands at a low figure of 3·6 oz., as against the All-India figure of 6·6 oz. Some of the other large milk producing provinces have a higher per capita consumption. It is 22 oz., in Sind, 19·7 oz. in the Punjab and 15·6 oz. in Rajaputana. The per capita consumption among the urban population is not adequate either. It is 6·9 oz. in Madras City, 8·2 oz. in Madura and 7·1 oz. in Trichinopoly. The per capita in-take in important cities however is almost twice that of the average daily consumption of milk and milk products in the Province taken as a whole.

The increase in prices of milk has resulted in a progressive reduction in the conversion of milk into milk products. With the increasing purchasing power and better wage rates among the labouring classes the urban supplies of milk are becoming totally inadequate. As this Province normally exports over a lakh of maunds of ghee, it is also necessary to conserve and use locally all the milk fat produced here.

299. As milk production is mainly a rural industry there is no problem of elaborate assembling, treatment or distribution. For the urban demand, however, which is about 15 per cent of the total production, the required quantity has to be assembled and distributed. The assembly of milk has always been a difficult problem. Production is carried on in very small units, scattered over a wide area. Around big cities production is more concentrated. About two-thirds of the requirements of the urban population are produced within municipal limits and the remaining one-third is brought from outside places situated within a short distance. The business of production and distribution of milk is

mostly in the hands of petty dealers with limited means and narrow outlook. Of late, co-operative milk supply unions have successfully established themselves in some cities but they have not yet succeeded in replacing even a negligible portion of the regular trade. Dishonest competition among the petty dealers has stood in the way of expansion of milk unions. The functionaries in the city milk trade are the producers, wholesalers and retailers. From the individual producer who is himself a retailer dealing even under 10 lb. of milk per day, to a large wholesome firms who style themselves as dairy companies handling 300 to 500 lb. of milk daily, there are various types of organizations handling varying quantities of milk. A few producers take the animals to their customers' houses and milk them there. There is considerable scope for improvement in the methods of production and marketing of milk. The milk production and distribution in many cities are carried on under very unsatisfactory conditions. The animals are kept under exceedingly congested and filthy conditions. They are maintained with purchased fodder. The quality of the milk marketed is not satisfactory. Adulteration is rampant, and whatever inspection and control is carried on at present is wholly inadequate to stop the practice. Investigations in the Agricultural College Dairy at Coimbatore have shown that by the adoption of the very elementary principles of sanitation and hygiene it is possible to produce good milk with a low bacterial count, which will keep sufficiently long without getting spoiled.

Pasteurisation of milk

300. There are only two pasteurising plants owned and operated by the Madras Co-operative Milk Supply Union and the Coimbatore Co-operative Milk Supply Union. There are various reasons why pasteurisation has not become established in this country. The most important of them seems to be the large capital investment required for the installation. Moreover, an economic pasteurising unit must be able to assemble at least 5 to 10 thousand lb. of milk every day. This is certainly a difficult problem considering the present conditions of milk production and distribution in cities. Facilities for quick transport are poor and inadequate. The consumers, including public institutions, seem to care more for cheapness than for quality. Pasteurisation cannot make bad milk good and therefore a minimum amount of attention has to be bestowed for producing 'clean milk' which is fit to be pasteurised and till this stage is reached there may not be much scope for pasteurisation. Another aspect of the matter is that the habit of boiling milk is so much ingrained in the domestic practice of our people that, even pasteurised milk is boiled before use.

Trade in dairy products

301. The share of Madras in the inter-provincial and international trade in dairy products consists of imports of large quantities of condensed milk and the export of substantial quantities of

ghee. Owing to the difficulty experienced in getting a regular supply of milk of standard quality, some institutions usually buy imported dairy products in normal times. The imported products consist mainly of condensed milk, milk foods and cheese. The average annual pre-war imports are given below :—

	Quantity. in cwt.	Value in lakhs of rupees.
Condensed milk	15,556	6·43
Milk food	2,731	5·14
Cheese	1,227	0·94

Denmark and the Netherlands were the main sources of supply in pre-war days. Small quantities of butter and ghee were also imported and the average annual import during pre-war years was 1,468 cwt., valued at Rs. 1·32 lakhs. These imports are mainly from the neighbouring provinces, Bombay being the chief supplier.

In spite of the very low production of milk, there is a large export trade in ghee which accounts for 9 per cent of the ghee output of the Province. The exports were to Bengal, Orissa and Mysore and also to the Straits Settlements, Ceylon, Burma and the Federated Malaya States. Burma and the Federated Malaya States markets have been closed due to the conditions created by the war. On an average the total annual export of ghee in the pre-war period amounted to 112,598 maunds valued at Rs. 17 lakhs. In view of the increasing prices for dairy products and the local shortage of supplies, the Government have imposed a ban on exports of ghee except under a permit issued by the Commissioner of Civil Supplies as a measure of war emergency. Having regard to the dietary deficiencies of the Province, the continuance of this restriction even in normal times seems necessary.

Dairying as a subsidiary rural industry

302. The maintenance of milch animals for selling milk and other dairy products like ghee is an important rural industry, as it provides occupation to a large number of people, especially women-folk, in rural areas. This is an important and useful subsidiary occupation to cultivation. The total quantity of ghee and butter produced in this Province is nearly one million maunds valued normally at Rs. 4,00,00,000. The Provincial Marketing Officer has estimated the number of people taking part in ghee production at 800,000 based on the total number of she-buffaloes maintained in the Province. One half of them are engaged in retailing their own produce. In the Guntur and Coimbatore tracts buffaloes are maintained in varying numbers, generally two to three per holding. The womenfolk in addition to helping the ryot in farm work, attend to these buffaloes also. It forms part of their routine farm work. They attend to the feeding and milking of the animals and the churning of the curd to butter. The butter is sold as such to the local dealer or converted into ghee and then sold. The sale proceeds

are generally the assets of the womenfolk and the savings are utilised for buying cattle food or replacing animals or in jewellery and clothes. In many cases this income makes the womenfolk independent in respect of running the household. Sufficient pocket money is always available to them to meet all odd and sundry expenses. In dairying economy the sale of milk as milk is the most profitable form of disposal. If we take the price of milk at 2 annas per lb., 100 lb. of milk will fetch Rs. 12–8–0. If converted into ghee, the ghee outturn will be only 5 lb., which by sale will bring in a return of about Rs. 6. The explanation for the large ghee trade is that there is no special cost for the ghee produced in the farm. It is a bye-product of farming. The farmer and his family consume the buttermilk which is rich in proteins and minerals. He generally sells the ghee and purchases vegetable oils which are cheaper.

In the rural economy of the Province, no other improvement can bring about so good results in bettering the status of the farmer as the development of the livestock industry. It provides him with better work cattle at a very low or negligible cost, resulting in more efficient farm work. He gets cattle manure as a bye-product. His cash income is increased by the sale of larger quantities of milk, produced more economically. The value of the livestock and dairy industry as the most important subsidiary occupation to agriculture can hardly be over-emphasized.

Veterinary services

303. The organization of Veterinary aid dates back to the year 1868, when Lord Mayo as Viceroy appointed a Commission to report on cattle diseases in India and the measures necessary for their prevention and cure. The Commission recommended the organization of a Civil Veterinary Department, but nothing came out of the recommendation. Subsequently, several commissions stressed the need for a Veterinary Department and finally the Civil Veterinary Department was formed in 1891. Through its various Veterinary dispensaries and itinerating Veterinary Assistant Surgeons, the department renders medical aid to such of the cattle as are attacked by diseases or are otherwise rendered unfit for work. Veterinary hospitals and dispensaries have been established in all the headquarter towns of the districts and in most of the taluk headquarters. There are 135 Veterinary Institutions in the Province and annually over 3 lakhs of in and out-patients are treated in these institutions. The itinerating Veterinary Assistant Surgeons who number 165 also assist in the treatment of cattle and animals in rural areas and they handle about 1½ lakhs of cases annually. Their jurisdiction extends normally to one taluk and they attend to the outbreaks of contagious diseases, castration of animals, treat minor ailments of cattle, organize cattle shows and advise the ryots on all livestock matters.

The Royal Commission on Agriculture, 1928, was of opinion that the aim should be to provide on an average at least one Veterinary Assistant Surgeon for every 25,000 cattle. On this basis, the total number of Veterinary Assistant Surgeons required for the Province of Madras is 880 but there are now only 300 Veterinary Assistant Surgeons. The jurisdiction of many of the Veterinary Assistants extending as it does to two or more taluks is too large. The number of veterinary hospitals and dispensaries is not adequate and the policy adopted by the Government since 1937 to open new veterinary institutions only in places where fifty per cent of the non-recurring and recurring charges are contributed by local bodies or by the public has resulted in an uneven distribution of these institutions. Many of them are located in district headquarters or in other towns and the ryots of interior villages are not able to avail of the facilities offered by them. A peculiar feature in India is the absence of the private practitioner in veterinary medicine. Of late, some veterinary doctors have been setting up private practice but their number is negligible.

Veterinary research

304. [1]The Royal Commission on Agriculture, 1928 observed :—

"In no sphere has scientific research conferred greater benefits on agriculture than by the provision of means of controlling livestock diseases."

The Commission also paid tribute to the record of good work standing to the credit of the Civil Veterinary Departments in this country. However, modern scientific developments bring about fresh methods for solving old problems more efficiently and the search for new knowledge is a continuous one. Veterinary Research in India goes back to the year 1890, when the first Imperial Bacteriologist began his researches and investigations at Poona into the diseases of domesticated animals and the means of preventing and curing them. Rinderpest and Surra were the first to be tackled. As Poona proved unsuitable for Rinderpest research the laboratory was moved in 1893 to Mukteswar, in the United Provinces where, the first achievement was the discovery of the anti-rinderpest serum. Other discoveries followed and the Institute began to supply various sera and vaccines for use against the several diseases of cattle all over India. The supply was free in the initial stages but in 1925 the Institute was placed on a self-supporting basis by charging for the supplies of sera and vaccines made to the various Provinces and States. The Institute gradually expanded its activities which resulted in the bifurcation of its functions. The Izatnagar Institute was started for the manufacture of sera and vaccines and the Mukteswar Institute continued with pure research. Rapid progress was made in the research field in the investigations of various diseases and control measures. Simultaneously, Provincial institutions also began to take an active part in the field of research. Veterinary research connected with

[1] Royal Commission on Agriculture in India, 1928 (Abridged Report), page 312.

the special problems of this Province is now carried on in the laboratories attached to the Madras Veterinary College. A Serum Institute was opened in Madras in 1932 to prepare the biological products necessary to combat rinderpest and later the manufacture of products against other contagious diseases was also undertaken. It was temporarily shifted to Coimbatore in April 1942. The question of construction of permanent buildings in or near Madras to house the Institute is under consideration.

Cattle mortality

305. The following statement shows the mortality from contagious diseases and other causes among livestock in this Province from 1935-36 :—

Cattle mortality in the Province of Madras.

——	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.
(1)	(2)	(3)	(4)	(5)	(6)*
Rinderpest	2,752	5,102	7,983	8,648	13,270
Anthrax	2,383	3,339	3,282	2,107	3,239
Hæmorrhagic Septicæmia.	5,664	6,353	5.670	3,801	4,503
Foot and Mouth ..	976	2,965	2,358	610	1,055
Black quarter ..	5,857	7,929	11,189	9,554	4,630
Others	5,582	7,511	12,196	34,083	19,635
Total ..	23,214	33,199	42,678	58,803	46,332

	1940-41.	1941-42.	1942-43.	1943-44.	1944-45.
	(7)	(8)	(9)	(10)	(11)
Rinderpest	17,858	14,001	13,033	43,836	29,084
Anthrax	3,324	2,379	2,556	3,375	2,151
Hæmorrhagic Septicæmia.	4,938	5.248	4,191	5,898	8,931
Foot and Mouth ..	1,193	1,026	1,065	809	433
Black quarter ..	4,688	3,694	6,539	5,212	4,019
Others	23,383	14,778	25,041	17,150	10.185
Total ..	55,384	41,126	52,425	76,280	54,803

The annual reported mortality from contagious disease has ranged from 23,214 in 1935-36 to 54,803 in 1944-45. The increase in mortality can be explained in two ways; it may be due to an actual increase in mortality among cattle or to increasing efficiency in the recording of deaths. The more efficient the reporting system becomes, the larger will be the number recorded up to a stage. Whatever may be the number of deaths per annum, the largest number of deaths among cattle is due to preventible contagious diseases. Another point is the rapid increase in the number of deaths from rinderpest. The annual deaths from rinderpest rose

from 5,102 in 1935–36 to 43,836 in 1943–44. Rinderpest is a disease which, though always present in some part of the country or other, has waves of virulence from time to time which take three or four years to reach their crest. On the other hand the annual deaths from other contagious diseases like Hæmorrhagic Septicæmia, Black quarter, Foot and Mouth disease and Anthrax have remained stationary almost around the same level with slight variations in some years. The actual monetary loss to the cultivator by the death of his cattle is only a small part of the total loss which he suffers. For example, though rinderpest is not so deadly among the plains cattle and the average mortality may not be more than 30 per cent, the remaining 70 per cent are considerably enfeebled by disease. They are unable to work for several months and the ryot has to maintain them and at the same time find substitute animals to carry on his cultivation. So too, in the case of foot and mouth disease. Generally for every animal that dies from foot and mouth disease, ninety-nine may be temporarily incapacitated. If the actual figures of deaths are interpreted in the light of these considerations, it will be evident that epidemic diseases cause great injury to the cultivator through the death of his cattle and also result in considerable indirect loss through the illness of his working or milking stock. The loss in crops consequent on inefficient cultivation when working animals are stricken by disease is considerable. The financial instability which it creates in the farmer's economic life is also another important factor to be reckoned with. In long-term policies, the breeding of better livestock is considerably handicapped by uncertainties of animal life due to contagious diseases.

Control of contagious diseases

306. The importance of the measures necessary and the magnitude of the task the department is facing is exemplified by taking the one instance of rinderpest. In some countries the advance of veterinary medicine has been such that rinderpest is now regarded as a disease that can be brought under more or less speedy control through resolute action. Unfortunately under Indian conditions it is not possible to stamp out the disease on the lines adopted in other countries. The disease is wide spread; effective isolation would be so expensive as to be impracticable and owing to religious sentiment, the destruction of healthy animals which have been in contact with the infested ones cannot be contemplated. The method of zoning the affected areas, successfully followed in South Africa, also requires considerable organization. The policy of stamping out of a disease can succeed only when the disease has been reduced to small proportions or when localised. In the meantime, rinderpest and other contagious diseases must in the main be combated by measures which aim at protecting the individual animal rather than by measures which aim at stamping out the source of infection. The " Serum Simultaneous " method of

conferring immunity from rinderpest has been successfully adopted. In this process the virus of the disease is injected into the animal at the same time that serum is used. A mild attack of rinderpest follows. The tissues of the animal prepare their own anti-bodies and an immunity for several years is created. The Veterinary Department has been carrying on inoculation campaigns free of cost to the cultivator. Compulsory inoculations were suggested by various bodies including the Royal Commission on Agriculture with a view to controlling the disease. But so far there has been no need to use compulsion except in rare instances. The fact is that cultivators very well appreciate the advantages of the Serum Simultaneous method but the existing staff are unable to meet the requirements of the rural population with regard to protective inoculation. During the year ending March 1945, the Veterinary Department carried out 466,099 inoculations by the Serum Simultaneous method with goat virus. It is now possible to immunise animals against most of the other contagious diseases also. The spread of the contagious diseases is controlled by the application of the Madras Cattle Disease Act, 1866 and the Madras Rinderpest Act, 1940.

Reporting of cattle diseases

307. The successful control of contagious diseases among cattle is largely dependent on early discovery and prompt action on the part of the authorities and the veterinary staff before the disease has time to spread. Therefore there is great need for an efficient system of recording and reporting of outbreaks. Village munsifs maintain a cattle mortality register in which deaths due to certain important contagious and non-contagious diseases of animals are entered with dates of occurrence. In the event of an outbreak of a contagious disease in a village, the village munsif is required to send a report immediately to the Tahsildar of the taluk with a copy to the Touring Veterinary Assistant Surgeon. The initial outbreak report is followed by weekly progress reports until the disease subsides. With regard to mortality statistics, the village munsifs send monthly mortality returns to the Tahsildar who forwards them to the Collector of the district, who sends the consolidated monthly return for the district to the Director of Veterinary Services. The returns are consolidated and reported by him. In practice, this system did not work satisfactorily. The number of deaths reported was generally far less than the actual number. Apart from this, the causes of deaths were not also correctly reported, deaths from rinderpest being registered under anthrax and those from anthrax, under hæmorrhagic septicæmia and so on. This is partly due to the indifference on the part of the village munsifs and partly to their inability to differentiate the diseases. There was also a large number of unregistered attacks and the delay in reporting outbreaks was considerable. In 1935, the Government examined the whole question and considered that the

efficiency of reporting would be greatly enhanced by enlisting the co-operation of other departments and private bodies. Presidents of forest panchayats, village panchayats and irrigation boards were entrusted with the work of reporting outbreaks of cattle diseases within five miles of their own villages. For this purpose they are supplied with green cards in which outbreak reports can be made without affixing postage stamps. The number of reports received through green cards is very small but this position is likely to improve in due course.

CHAPTER VIII—RURAL INDUSTRIES

Introductory

308. Rural industries may be divided into three classes. In the first class are industries which are a wholetime occupation; in the second class are industries which are subsidiary to agriculture; and in the third class are industries which may be suitably termed as cottage industries, which enable the agriculturist and his family to be occupied in their spare time. The important industries in the first class have by tradition been carried on by persons belonging to certain communities. The handloom weaving industry, for example, is generally carried on by the weaving community. In certain places, however, the Muslims are good weavers. The local crafts in the village like the smithy, and the goldsmith's trade are also industries of a communal character. Sheep rearing is also an example. What these industries require is rehabilitation by reference to modern conditions and re-organization at all points. They should not be taken up as affording relief from the pressure of population on the soil. In the second class of industries will fall oil milling, groundnut decorticating, rice milling, sugarcane crushing and the like. These industries afford employment to the agriculturists in the off-season. What, however, is not often recognized is that except in regard to the industrial units like rice mills, in many of the occupations (like jaggery-making) it is the agriculturist himself who is employed. This is relevant in assessing the extent to which these can be developed to afford fresh opportunities for the employment of the agriculturist in his spare time. These industries call for work only after the harvest of the respective crops. In the third category can be grouped together practically any industry which does not demand great skill or the assembling of a large mass of machinery. Even in respect of the latter it may be possible to split up certain preliminary processes as near the sources of raw material as possible and then bring the half-finished product to the factory for finishing. Grading of tobacco and the earlier processes with respect to ceramics are instances. The rural industries dealt with below will have to be appreciated in this background.

Hand spinning of cotton

309. Hand spinning of cotton is a home industry providing a useful subsidiary occupation both for men and women. It has been practised as a subsidiary occupation by all classes of people from time immemorial. It more or less died out after the advent of the cotton mills, but recently it has been revived as a result of the "Swedeshi" movement. It is now carried on practically in all parts of the Province. The All-India Spinners' Association and khadder propagandists have been largely responsible for developing this industry. In 1937–38, the Government sanctioned Rs. 60,341

to be utilized by the branches of the All India Spinners' Association in this Province to finance, design and supply various accessories and implements, to conduct research in carding, spinning, printing and dyeing and for the training of workers and the employment of these workers as instructors in the villages with a view to increasing the efficiency of the artisans and the implements used. In addition the Government granted a subsidy up to a maximum of Rs. 1,25,000 in 1937–38 on the actual increase of production of khadi during the year calculated at the rate of one anna per square yard of increase. The Association was found to be eligible for a subsidy of Rs. 43,494 only on the basis of the increase in production. In 1938–39 the Association was given Rs. 1,86,260 representing grants and subsidies. Similar grants and subsidies were given in subsequent years also.

310. The raw material required is cotton. It is purchased locally and usually ginned and cleaned by the workers themselves with gins and bows. It is then made into slivers. Cotton slivers are also sold in the bazaar and by the depots of the All India Spinners' Association. It is then spun on a charka which costs about Rs. 5 to Rs. 15 according to the type of charka. The spun yarn is converted into cloth by the workers by giving it to weavers or is sold to the depots of the All India Spinners' Association. There are no middlemen in the industry. Generally, marketing does not present a problem, as there is great demand for yarn and in most cases the All-India Spinners' Association purchases the yarn. The industry is not organized in many places. Only in a few places, viz., Chittoor, Madanapalle, Vizianagaram, Kavur (Guntur), Kuvur Vinayashramam (Guntur) and Nandyal, co-operative societies have been organised. The societies have a membership of 1,260 and a share capital of Rs. 7,750. Only two societies, viz., the Vizianagram Khadder Spinning and Weaving Co-operative Society and the Madanapalle Hand Spinners' and Weavers' Co-operative Society have been working satisfactorily; the other four are dormant as the members and promoters have not continued to take interest. The following are the economics of the industry for spinning yarn of 18 to 24 counts from 1 lb. of cotton.

	RS	A.	P.
Cotton 1 lb.	0	8	0
Carding charges	0	2	6
Total ..	0	10	6

From 1 lb. of cotton 20 "chittams" of yarn are produced within three days.

	RS.	A.	P.
Price of 1 chittam	0	2	6
Price of 20 chittams	3	2	0
Cost of raw material	0	10	6
Income for three days	2	7	6
Income for one day	0	13	2

Assuming that the worker himself does the carding and making of slivers and that he takes one day for each, the average daily income comes to Re. 0–7–11 or 8 annas. The economics of the industry depends to a large extent on the quality of the yarn spun, i.e., on the efficiency of the spinner to spin yarn of finer counts and of uniform texture. A worker with some experience in spinning can easily earn not less than about eight annas a day.

Hand spinning is easy to revive in rural areas. It requires little capital, training or technical skill and can, therefore, be undertaken even by the poorest. It can be taken up and left off at any stage, and in the All India Spinners' Association there already exists an organization to guide it on proper lines and help in marketing. The members of the Vizianagaram Khadder Spinning and Weaving Co-operative Society have been carrying on the industry with no capital of their own. The industry requires little physical exertion. Even women and old people can contribute something to the family income. There is a possibility of increasing the income by increasing the output by improved spinning machines. Compared with the economics of the mill-made yarn, the economics of this industry are certainly low. It, however, provides a suitable subsidiary industry to the agriculturists and other rural people who have little else to do.

The handloom industry

311. The handloom industry has always occupied a premier position among the rural industries in this Province. The number of looms in Madras is greater than in any other Province except Assam. The Fact Finding Committee (1941) estimated the number of looms in this Province at 340,450 of which 269,306 were active and the remaining idle. Their annual output was assessed at 446,300,000 yards valued at Rs. 11,11,07,000. The Committee estimated the number of persons employed in the industry at 486,829. On the assumption that about three persons are dependent on a weaver, which is a very moderate estimate, the population dependent on the industry about the beginning of this decade was 1,460,000. The industry is thus second in importance only to agriculture. It is primarily a wholetime industry but it offers subsidiary occupation to the family of the agriculturist to some extent. The handloom weaver, except perhaps in the dim past, has always had to contend with difficulties. The actual weaver is under the control of a master-weaver who acts both as a trade middleman and financier. Like the agriculturist in relation to the village money-lender, the master-weaver has the weaver in his clutches by a system of advances that are constantly outstanding; but like the village money-lender he performs a useful function in organizing the financing of the industry and watching the trade in a manner that the individual weaver cannot do. The difficulty of the weaver is that he does not get his due share. The weavers in the villages generally belong to communities that have been carrying on the industry for generations, and what with poverty, exploitation and constant indoor work, they compare unfavourably with the average

ryots. The handloom industry itself has, in recent years, been tending to decline. The main cause that started off the downward trend was the development of machine woven fabrics in England and later in India itself. The protection extended to the mill industry in 1922 in the form of an import duty on foreign yarn raised the cost of production of cloth on handloom. The suspension, and later, the abolition of the excise duty on cloth enabled mill cloth to compete more effectively with handloom fabrics. The economic depression accentuated the decline. There are also certain inherent economics in the large scale production of the mills that cannot be overlooked. Gradually therefore more and more looms become idle. In 1920–21 India imported 1,450 million yards of cloth, Indian Mills supplied 1,430 million yards and the handlooms 1,150 million yards. In 1930–31, the corresponding figures were 870 million yards; 2,460 million yards; and 1,360 million yards. In 1939–40, they were 560 million yards, 3,790 million yards, and 1,600 million yards. The share of the Indian mills has been steadily going up. From the beginning of the war, however, the handloom industry started looking up, partly due to the pre-occupation of the mills in India with war supplies. The policy of the Government of Madras in getting part of the standard cloth output from the handlooms also helped in this revival. Just at present a boom exists in the handloom industry.

312. In discussing the future of the industry a practical question is, can the handlooms ever produce cloth as cheaply as the mills? The industry can flourish only to the extent of its utility. With the mills now turning back to civilian production a crisis in the handloom industry is imminent. The development of power textiles is a definite modern trend and it is neither desirable nor possible to stop it in order to bolster up the handloom industry. At the same time, the state cannot sit back and watch the livelihood of one and a half million people being slowly taken away from them. The problem becomes more a social than an economic one; in other words, it is not the problem of handloom weaving that is important but the problem of the handloom weaver.

A practically sweated industry like handloom weaving will no doubt cling to life with surprising tenacity. It is significant that when the figures of production of the last three decades in India are compared, there is an actual increase in handloom output by 30 per cent. The mill industry has expanded more at the expense of foreign imports than the handlooms. Another relevant circumstance is the type of cloth in which handlooms specialize. The majority of the handlooms use yarn of less than 40 counts. 13 per cent of the looms use very high counts. The cheaper fabrics that are used in the country-side and the best fabrics in which quality, individuality, fancywork and design count more than price are thus lines in which the handlooms may well specialize in the future. This may perhaps lead to a gradual reduction in the volume of their output but this should be counteracted by measures to absorb the surplus in other occupations principally in the textile industry

itself. The organization of the handloom industry should also be improved. Starting from the mill that supplies the yarn, it is first necessary to prevent intermediate costs between the mill and the weaver from being heavy. At present, the yarn trade has to pass through wholesalers and retailers and each agency adds a percentage. The Government either acting directly or through co-operative organizations, must set up organizations that should, except for overheads, pass on the yarn to the weaver at ex-mill prices. The weavers themselves must be organized into co-operative societies, attached to the yarn selling co-operative organizations on the one side, and the Provincial Handloom Marketing Society on the other. The weaver has to be relieved from two difficulties, an addition to his cost of material by the yarn dealer and substractions from his selling price of cloth by the master-weaver. Another line of approach to the problem is the organization of the weavers into small factory units as in Malabar, and the promulgation of legislation to regulate these small units. At present there are weavers co-operative societies, but they have just touched the fringe of the problem. During the coming five years it is proposed to bring at least 50,000 looms under co-operative organizations. A number of dye-factories are also proposed to be erected to enable the handlooms to obtain their requirements of dyed yarn.

Cotton Dyeing and Printing

313. Dyeing and printing are ancient industries like cotton weaving and claim co-existence with it. Before the advent of synthetic dyes, they were to a large extent the hereditary occupation of certain classes but this exclusiveness no longer exists. Dyeing was then an art which required a thorough knowledge of the various vegetable dye stuffs and the proportions in which they had to be mixed to yield different shades. It has now become an industry that can be carried on without much special skill. Dyeing of cloth and yarn is carried on in the Circars, North Arcot, Salem and Chingleput districts.

Block-printing on cloth is done in the Circars, and in the Madura district. The industry is chiefly in the hands of master-weavers and middlemen who employ labourers. They carry on the industry generally with their own funds and sell the finished goods. In some centres, e.g., West Godavari and Kistna districts, the owners of dyeing and printing houses execute orders from the public and traders who supply the cloth or yarn. The Madras Handloom Weavers' Provincial Co-operative Society, Limited, has four dye factories at Salem, Chirala (Guntur district), Madura and Rajahmundry so as to meet the requirements of coloured yarn of the primary weavers' co-operative societies. Some of the primary weavers' societies are having their own dye houses. The Provincial Society has also a screen printing factory at Madras. The chief raw materials required are the dye stuffs and chemicals. Very rarely are indigenous dyes used. In Masulipatam, the ancient art of "Kalamkari" printing with indigenous dyes is still carried on

by a few families. This ancient industry nearly died out but has been revived by the Provincial Society by placing large orders for this fine printed cloth and marketing it through its emporiums. Dye stuffs are imported from foreign countries like the United Kingdom and the United States of America. The Imperial Chemical Industries are the chief importers of dye stuffs in this Province. The workers obtain the dye stuffs from local merchants or agents of the Imperial Chemical Industries. Chemicals, except hydrosulphite of soda, are also obtained from local merchants. They are generally supplied by the Mettur Chemicals. As regards hydrosulphite of soda which is an essential chemical in dyeing, the Madras Handloom Weavers' Provincial Co-operative Society, Limited, is the sole distributor for the Province. The distribution is made by the Provincial Society in the city and its sales emporiums in the mufassal under a system of permits issued to consumers by the Provincial Society. No elaborate tools and appliances are required for the industry. For dyeing, tubs for boiling and dyeing cloth are required. For printing on cloth, wooden blocks with various floral and other designs are necessary and they are made locally to order. A tub costs about Rs. 50 and a wooden block from Rs. 2 to Rs. 10 according to the design and workmanship. In the Circars the average daily wages of a worker range from Re. 1 to Rs. 1-12-0 while they range from Rs. 1-8-0 to Rs. 2-8-0 in the Tamil districts.

314. In most places the industry is well organized and does not generally suffer from serious handicaps except difficulties in securing sufficient quantities of dyes. With the advent of synthetic dyes, the industry is dependent on foreign dyes. The extent to which local natural dyes can be used as well as the prospects of starting a large scale dye industry in the country are matters that require examination. Nearly 55 per cent of the yarn consumed by the handloom weavers is dyed yarn. The handloom weavers of this Province absorb about 25 per cent of the total quantity of dyes consumed by the handloom weavers in India. When with the outbreak of the War there was a general shortage of dye stuffs, and the imports of synthetic dyes became restricted, the Industries Department took up the question of reviving the use of natural dyes obtained from indigenous plants. Experiments were conducted at the Government Textile Institute, Madras, with natural dyes of indigenous growth, and information about the method of extraction of colouring matter from these natural products and recipes for different shades were printed and published. The Government also requested the Director of Agriculture to take steps to conduct propaganda in favour of cultivation of indigo and turmeric. The Vegetable Dyes Committee suggested (1) the preparation of standard extracts of a few carefully chosen dyes, (2) the preparation of dye extracts for colouring foods and allied articles and (3) synthetic work on the preparation of new dyes from one or two natural colouring materials chosen as raw materials. It is understood that the schemes of research on vegetable dyes in

accordance with these lines are in progress under the auspices of the Government of India.

Though printing by the textile mills has affected the hand printing industry, there is still scope for the development of hand block printing as in certain floral and other designs it can hold its own against the competition of mills. In recent years, owing to changes in public taste and fashion, there is a growing demand for hand printed fabrics for use as saris, jackets, door and window curtains, table and bed spreads. The Screen Printing Factory of the Madras Handloom Weavers' Provincial Co-operative Society, Limited, which has employed 11 printers and 2 designers, has recently introduced multi-colour printing and the daily output is about 500 yards. The designs are very popular with the public.

Hosiery

315. Manufacture of hosiery can be a cottage or a large scale industry. In this Province it is both. There are fifteen organized hosiery factories coming under the Indian Factories Act. In addition there are a large number of small hosiery units employing less than twenty persons. The industry had to face keen competition from imports from Japan, but the war has given an impetus to the industry and its position is steadily improving. The knitting machine can be worked by power as well as by hand. It is a home industry suitable for women who can work the machine by hand in their spare hours. Each family can own a small knitting machine which does not cost much and the art can be learnt easily with a little training. Knitting machines have to be imported from foreign countries, and though they are not immediately available they can be imported in the near future. Further the question of manufacturing them in India needs examination. This is an industry in whose development women's co-operatives can play a large part. Co-operative societies can introduce the industry among several families by advancing the necessary amounts for the purchase of knitting machines, supplying the necessary yarn for knitting and undertaking the marketing of the hosiery goods produced. The advances can be recovered from members in easy instalments from the sale proceeds of the knitted goods. In course of time the output of the members' labour on the knitting machines can be capitalised and they will become the owners of the machines.

Lace and Embroidery

316. Lace and embroidery are minor industries capable of being pursued by all classes of women, rich and poor. But they are confined to the several industrial schools for girls in the Province and to missionary institutions like the Mylapore Home Industries. A few women make them not for sale but for their own use. Lace making is carried on as a cottage industry in about 60 villages in Narasapur and Palacole taluks of the West Godavari district. About 2,000 women and girls over 8 years belonging to all castes, but

drawn mostly from Christians, Pallis (fishermen caste) and Telegas, are employed in producing Irish crochet lace. The workers being poor carry on the industry only for wages. Middlemen in the trade purchase diamond thread, supply it to workers and take back the finished goods after paying wages. On an average a woman gets 6 annas a day and a girl 4 annas. The industry has received an impetus on account of the war. Women evacuees from Burma who had to earn their livelihood took to this industry in large numbers. A co-operative society mainly for these women was organized at Narasapur. Crochet lace produced in this district is not marketed for local consumption, but exported to foreign countries like South Africa, Canada and the United Kingdom. The industry suffers from two handicaps, viz., lack of adequate supply of diamond thread and of an established and steady market for the goods in foreign countries. In Madras (Triplicane), in pre-war days, about 300 persons used to be engaged in embroidery in silver lace on silk frocks and sarees. They used to work for private firms and drapery shops, for wages ranging from 8 to 12 annas a day. But owing to the scarcity of lace and finer varieties of costumes on account of the war, they were engaged in preparing badges for war orders. The middlemen used to obtain the lace from Surat and supply it to the workers, taking back the finished goods. More than Rs. 30,000 used to be paid as wages in a year to these workers. The finished goods found ready sales in Karachi and other places in Northern India.

317. In Madras City, a woman instructor for embroidery has been appointed out of the Madras Provincial Co-operative Bank's grant for the development of women's cottage industries and six women's cottage industries co-operatives have been organized. The work undertaken by these societies is mainly needle work, tailoring and embroidery. As embroidered goods find sales only among the rich and upper middle classes, their market is limited and the possibilities of developing the industry on any large scale are also limited. But the industry provides a useful subsidiary occupation to women of all classes who have spare time.

Silk

318. There are two kinds of silk in this Province—mulberry silk and eri silk. The silk worms producing silk cocoons of the former variety feed upon mulberry leaves and the eri silk worms feed upon castor leaves. The rearing of mulberry silk worms is called sericulture and the rearing of eri silk worms is termed as ericulture. Both sericulture and ericulture are cottage industries which afford employment to a large number of people.

Sericulture

319. Sericulture is peculiar to the Salem and Coimbatore districts. While Kollegal taluk is famous in the Coimbatore

district, the Hosur taluk of the Salem district contains a few villages where mulberry is grown on a small scale. In the Hosur taluk the industry is carried on in about 80 villages in and around five centres, viz., Denkanikota, Berikai, Athimuguam, Hosur North and Hosur South. It is estimated that about 240 acres are under mulberry cultivation in this taluk. Kollegal is situated at an altitude of 2,000 to 2,500 feet above sea level and a very agreeable temperature varying from 75 degrees to 90 degrees Fahrenheit with an average rainfall of 30 to 32 inches in a year, and possesses ideal conditions for growing mulberry. It is grown in this taluk as an unirrigated dry crop. Almost every village in the taluk with the exception of a few isolated hilly villages has taken to this industry. The extent of land under mulberry cultivation is about fifteen thousand acres. Silk worm rearing is the main subsidiary occupation of the agricultural classes such as Sivabhaktas, Gangadhikars, Gowdas, Uppaligars and also scheduled castes who rear worms on a small scale. The mulberry plantation, when once raised, lasts for a decade requiring only regular pruning. The first leaf picking is made generally four or five months after planting. Ordinarily six to eight leaf pickings are made in a year. The bulk of the seed cocoons used by the Kollegal rearers used to be obtained from the Mysore villages. In order to render Kollegal self-contained in this respect, an experimental farm has been opened at Thadaguni which is located in the heart of the Kollegal silk worm rearing villages. The Department of Industries and Commerce is paying increasing attention to sericulture. Four silk farms are now maintained by the department at Coonoor, Hosur, Palmanar and Thadaguni. In addition, the department has been assisting the private farm at Vedakangulam in the Tinnevelly district. Seed cocoons are raised in these farms for distribution to Kollegal rearers in the shape of disease-free layings. The number of rearings in a year varies from six to eight and the rearing is carried on as a part-time occupation of the farmer who devotes two or three hours a day when it is in progress. Since the worms are domesticated and kept inside the house, the farmer and members of his family find ample time to tend them even in the busiest agricultural seasons; but generally rearings are so timed that they do not ordinarily interfere with other agricultural work. One thousand seed cocoons give about 400 female moths or 400 layings of eggs. These are ordinarily reared in a tray in the first week, in two trays in the second week, and in four trays in the third week and they occupy about 20 trays in the mature stage. The yield from them is about 5 maunds of cocoons.

320. The first Tariff Board and the Industries Conference held at Simla in 1934 considered that the distribution of " cellular " seed was the first problem which had to be solved, if sericulture was to be improved and developed, and as a result, the Government of India decided to distribute annually for five years among the several Provinces, grants amounting to one lakh of rupees. A subvention is being granted every year to Madras for the production

and distribution of disease-free cellular seeds, for the conduct of research on the diseases of silk worms, and for the production, and distribution of disease-free cross-breed seeds in the Kollegal taluk. Out of the Government of India grant and Provincial Funds, fourteen moth testers are now employed by the Government in order to test, in the houses of the rearers, the seed cocoons produced by them and subsequently to supervise the rearings. They also distribute disease-free and cross-breed seeds to rearers. The Industries Department also purchase seed cocoons which are produced in localities other than Kollegal and sell the disease-free layings to the rearers at a nominal price. There are also ten aided grainages stationed in the important rearing villages of Alahalli, Chennalinganahalli, Chilakunadi, Hondrabalu, Hasmalangi, Kannur, Kamakarai, Kongralli, Singanellur and Thagarapuram, who test the seed cocoons and distribute to disease-free cross-breed seeds. The five sericultural demonstrators of the Industries Department stationed at important district centres, viz., Berikai, Denkanikota and Hosur in the Salem district, Tenkasi in the Tinnevelly district and Kshirasagaram in the Chittoor district have been carrying on intensive propaganda work. The total acreage under mulberry cultivation in all the district centres is about 500 and much useful work has been done especially at the Berikai centre.

321. The economics of the sericulture industry as carried on in the Salem district is as follows :—

Capital expenditure—

	RS.	A.	P.
1. Three acres of garden lands Rs. 200 × 3 ..	600	0	0
2. Appliances for rearing—			
(i) Wooden stand for mounting trays ..	7	0	0
(ii) Ten bamboo trays for rearing silk worms	7	8	0
(iii) Knife for cutting mulberry leaves ..	1	8	0
(iv) Spring trays for cocoons	7	8	0
Total ..	623	8	0

Recurring expenditure—

	RS.	A.	P.
1. Cost of manuring land	50	0	0
2. Cost of planting mulberry	25	0	0
3. Cost of weeding	25	0	0
4. Cost of (eggs) layings at Rs. 2 per 100 for 1,600 layings	32	0	0
Total ..	132	0	0

Income—

100 layings will produce about 20,000 cocoons.

1,600 layings will produce about 3,20,000 cocoons.

If sold for seed at Rs. 3-8-0 per 1,000 cocoons—Rs. 1,120.

If sold for reeling at Re. 1-2-0 per 1,000 cocoons—Rs. 360.

The Government are purchasing cocoons for seed purpose at Rs. 3-8-0 to Rs. 4 for 1,000 cocoons.

The annual net income if cocoons are sold for seed is roughly Rs. 1,120 — 132, i.e., Rs. 988. If sold for reeling (Rs. 360 — 132) or Rs. 228. The Sericulture branch of the Industries Department assists the rearers in the following ways :—

(1) Assessed and unassessed waste lands are given free for mulberry cultivation for a period of 3 years.

(2) Loans up to a maximum of Rs. 25 per acre are advanced for cultivation expenses for 3 years at $6\frac{1}{4}$ per cent interest per annum.

(3) Technical advice is given for rearing the first two sets of layings in the various centres.

(4) The seed or the layings are tested and supplied to the ryots and the cocoons are bought by the Government for seed purposes.

(5) The spring trays are lent to the ryots at 6 pies per tray.

Silk rearers do not generally reel silk. A few reelers in each central village own a crude type of charka. The process of reeling silk with these charkas does not give the necessary twist and uniformity to the silk thread. The Industries Department has introduced certain improvements in the country charka and many country charka reelers have carried out the improvements to their primitive reeling machines by attaching buttons and pulleys and this has improved the quality of the silk to a considerable extent. In 1941–1942, the Government sanctioned a scheme for the free distribution of Japanese model foot reeling machines, with re-reeling attachments, among the reelers; 62 machines were manufactured during that year and 34 machines were distributed by the Industries Department.

Ericulture

322. Ericulture is the culture of silk worms that feed on castor leaves. There are about 250,000 acres under castor cultivation in the Province and the cultivation is for castor seed only. The castor leaves now wasted, can be utilized to rear the eri worms and an important industry can be developed without detriment to the castor seed. The ericulture industry is the best subsidiary occupation for castor growers. The eri worms are bred entirely in cottages. They are hardier than the mulberry worms. The apparatus is inexpensive and the work involved is simple and can be carried on by women and children in their spare time in their own houses. The Industries Department has carried out demonstrations in ericulture at different centres in the Province. A number of persons have been trained in ericulture in the Government Textile Institute, Madras. The ericulture industry in the Province has not made much progress, mainly because of the absence of a ready market offering remunerative prices for eri cocoons. The Coonoor Silk Farm of the Industries Department continues, however, to grow castor and functions as a department centre for the production of eri eggs or seeds for purposes of distribution to all the centres in the Province.

323. The ericulture industry is given much encouragement in the Orissa Province. As ericulture affords a very profitable subsidiary occupation to castor-growers and provides a profitable exploitation of the castor leaves which go to waste now, there is no reason why the industry cannot be revived and a demand created for cloth woven out of eri silk. It is said that it is difficult to produce on the charka eri spun yarn of uniform quality and count and that eri cocoons can be supplied to waste silk plants for the manufacture of spun silk, if the waste silk plants can be set up at a low price. There should be scope for the setting up of a waste silk plant not only with a view to retaining in the country and converting into spun silk, the waste produced in Kollegal but also for utilizing the eri cocoons. Now that the war is over, it will not be difficult to obtain delivery of a plant from abroad. Co-operative societies can play a useful part in finding a market for eri silk cloth, if sufficient quantities can be produced.

Woollen Industry

324. The woollen industry in this Province may be divided into three sections :—

(1) Pile carpet industry ;
(2) Drugget industry ; and
(3) Cumbly weaving industry.

These industries are carried on both on a factory and on a cottage basis. The industries based on wool are generally localized in places where large flocks of sheep are maintained, and are carried on by Kurumbas who are professional shepherds. It is normally a subsidiary occupation. The Pile Carpet industry is pursued in and around Ellore in the West Godavari district, Masulipatam in the Kistna district and a few centres in the North Arcot district. In North Arcot it is organized more or less on a factory basis being attached to tanneries or being owned by people already in the tannery trade. The carpets manufactured are mostly for export and the industry is well organized. In West Godavari and Kistna it is not quite so well organized and is carried on by middlemen merchants and master weavers who own from two to five looms each. It is estimated that there are about 1,000 persons, mostly Muslims, employed in the industry. The number of looms in West Godavari district is estimated to be about 400. About 100 are said to be working in Kistna district. The merchants who control the industry obtain orders from outside and entrust the work to the master weavers. The rates at which the master weavers have to execute the orders are fixed and sometimes advances are also given for purchase of raw materials. The master weaver in turn employs a number of skilled workers who are paid about 3 rupees per square yard of 4½ threads carpet. The wages differ according to threads per square inch. The drugget industry is concentrated in the Salem and North Arcot districts, but principally in Salem in small

factories managed and controlled by manufacturers. The druggets are also generally exported. The raw material used is dead wool which is cleaned in a crude manner by a willow machine and afterwards hand-spun on charkas. The cumbly weaving industry is pursued by individuals in the Ceded Districts, West Godavari, Kistna, Guntur and Salem districts. The wool is obtained from their own sheep or purchased from owners of sheep or sheared on contract by the weavers themselves. The industry does not require large capital and the weavers generally obtain the necessary funds from the local money-lenders. The men attend to carding, sizing, spinning and weaving and the women help in spinning and carding. Nearly one-half to two-thirds of the workers are unskilled.

325. The cumbly weaving industry of the Ceded Districts is scattered over various villages in the districts of Anantapur, Bellary and Kurnool. The cumblies woven in the Anantapur villages are comparatively rough. The yarn is spun on a charka by the members of the weavers' family. The industry is carried on on similar lines in the villages in Bellary district except that a very much finer quality of cumbly is woven, the spinning there being of a high standard. In Kurnool district, the practice is to stretch the cumblies after weaving on a frame, pour boiling water over them and rub them in order to shrink the fibres and render them soft and 'felted' like the European type of blanket. The conditions under which the work is carried on in the villages of the Ceded Districts are extremely primitive. The houses of the weavers are so small that they cannot accommodate the looms within their houses. They are generally located outside the houses and in a few cases with a mat for shelter over them. The loom consists essentially of four pegs driven into the ground, a square beam, a small hole for the feet of the weaver, a rope and a bar of wood to which the warp is attached for stretching. Warp for only one cumbly is prepared at a time. It is sized with tamarind juice. The separation of the threads in order to obtain the shred is done in a very primitive way similar to that adopted in the case of the vertical pile carpet loom. The shuttle is, in some cases, no more than a piece of hollow bamboo with the wool weft stuffed inside; in other cases it is merely a small stick with the wool wound around it. It is thrown or pushed from a piece of wood with a wedge shaped " feather " edge.

326. In the Madura district about 500 persons are engaged in the industry. All of them are shepherds and rear sheep. The wool produced in the several centres is mostly purchased by middlemen on terms extremely disadvantageous to the shepherds and exported to Madras. The weavers use crude implements and the cumblies are of a coarse type and do not command good prices. They are sold by the producers themselves in shandies or to the merchants. The merchants in charge of marketing gain about 4 annas on each cumbly. Evidently due to the low prices fetched for the finished goods, the shepherds are tempted to sell the wool, as such, instead of spinning and weaving it. Lack of technical advice, absence of

proper organization, lack of finance and marketing facilities are some of the handicaps from which the industry is suffering in the district.

In the Coimbatore district the industry is carried on in two villages (viz., Kannampalayam and Kallangal in Palladam taluk) by over 500 persons as a cottage industry. The Kurumbas obtain wool from their own sheep or purchase it from neighbouring villages or from the Anamalais. When they obtain wool from neighbouring villages, they do not pay cash, but pay at the rate of 1 cumbly for shearing 50 sheep three times a year. The cumblies are sold in neighbouring shandies where merchants purchase them and send them to Sulur, Coimbatore, Tiruppur and Pollachi.

In Guntur, the industry is pursued as a subsidiary occupation by Kurumbas during the off season, when they are not employed in agricultural operations. It is carried on exclusively in three villages. The weavers do not rear sheep. They obtain wool from the coastal villages of Bapatla taluk. The cumblies being of a coarse variety, are sold within the district by the weavers themselves who hawk them in the villages. They are purchased by the agriculturists and the labouring classes. An attempt was made in 1939 to start a co-operative society for the weavers at Karupapalem but owing to their apathy and want of a market for the cumblies the proposal was dropped.

327. One bright feature in this industry is that the workers are not indebted to any large extent. This is mainly due to their frugal habits and the fact that they obtain the raw material from their flock or the amount required for the purchase of raw material is not large. They take small advances from the landlords under whom they are working. Sometimes they receive advances from the merchants for the purchase of wool and the advances are adjusted from the sale proceeds of the finished products. In the Beluguppa and Tanakal village of the Anantapur district, however the weavers are reported to be indebted to the merchants who keep them under their grip by advancing small loans liberally and keeping a sort of running account with them.

328. The wool required for the industry is sheared once in summer and once in winter for about 4 or 5 years. Wool is also sheared once when the sheep is two months' old. The wool obtained from rams and ewes less than one year old is said to be of a superior quality. The shearing is done by the weavers themselves and the instruments used are crude. Machine shearing is rare. The wool is sorted according to colours and length. The average yield of wool per sheep is about 2 lb. and in many cases even less. The yield is poor when compared with the yield of sheep in other countries, Australia 7½ lb., United Kingdom about 6½ lb. and the United States about 7 lb. The quality of wool produced in this Province is said to be poor. The reason is that the shepherds regard the sheep more as intended for supplying manure, mutton and

skins, the income from these sources being high. Another reason is that the sheep are not properly fed owing to the dearth of grazing facilities. Restrict ons have been imposed on the grazing of sheep in reserve forests and other Government lands. The main source of feeding is, therefore, the grass grown on hedges, and fallow fields. During the monsoon, they are fed on raw grass, and during the dry season they are sent to the jungle or allowed to graze on waste and fallow lands. In some cases the sheep-rearers who do not weave, sell the clippings to others. Weavers as well as middlemen purchase this right. The agents of mills at Bombay and Bangalore go into interior villages, advance money to the local sheep-owners early in the season and take away a major portion of the wool. Very often owing to the tempting terms offered by the merchants and the low value fetched by the crude woven cumblies, the weaver finds it more profitable to sell the wool as such instead of weaving cumblies and selling them. The cumulative effect of all these factors is that, while in some places the weavers do not get sufficient quantity of raw wool for their requirements, in other places full use is not made of the available wool. In either case, the weavers are obliged to keep idle during certain parts of the year. In some centres, wool is imported from outside the district. The wool required by certain villages in the Kistna district is purchased from the Hyderabad State. In certain centres dead wool is also obtained from tanneries nearby and used for weaving. The mixture of dead wool with live wool for weaving often spoils the quality of the goods produced, as the dead wool is not properly cleaned before use. One of the primary needs of the industry is the supply of wool in sufficient quantity and of better quality. For this purpose the breed of the sheep should be improved. In India, Bikaner rams and sheep are said to be of high quality. Sheep-breeding societies where Bikaner sheep are reared should be started in this Province. The cost of wool is not uniform in all places. A pound of raw wool costs about 8 annas now on an average.

329. The implements used at present are generally of a primitive type and need improvement. The use of the fly shuttle is very rare. The Industries Department has conducted tests on fly shuttle looms using machine spun yarn with a view to ascertaining whether the wool spun in Kudathini in Bellary district could be used as weft in fly shuttle looms. The experiment has shown that the strength of the wool is such that it may be used on the fly shuttle as easily as single cotton threads of 16s and 20s. The wool was first tried on the cotton handloom with a cotton warp and afterwards on a "jamakalam" loom with satisfactory results. If the jamakalam form of loom with healds, treadles and beating up comb is used, the output can, in all probability, be appreciably increased, whilst if the fly shuttle is also introduced for sue with single yarns, it will enable the output to be speeded up further. The cost of production also will be less. The output can be increased further if sectional warping machines for preparing long warps could be set up. Apart

from the introduction of fly shuttles, a good deal can be done to increase the weavers' output by the introduction of "treadles" and "healds" to obtain the shred and a slay to beat up the weft. The weavers are by nature conservative and are slow to take to improvements. The improved implements supplied to the weavers of Kanumolu were not used by them to any large extent. Two fly shuttle looms and a warping and sizing machine were supplied to the two societies in the Bellary district. But the members did not take to weaving on this improved type of loom. The looms are now kept at Bellary and training is being given to young Kurumba lads instead of to elders who are conservative. In the West Godavari district, the womenfolk use a takli for spinning and not the spinning wheel. The reason is that wages are paid in these parts according to weight and the spinning of fine yarn which involves extra labour will not fetch extra income.

330. The demand for woollen goods comes from widely different classes and it should be possible to afford employment in this industry practically all through the year. But in several places, the industry is carried on only during certain parts of the year. In Salem district the weavers work during 9 months of the year. They do not work during the rainy season. In Bellary district the work is carried on during the summer and the autumn only. In Kanumolu, the weavers weave during the months of June to December only. One reason is that the Kurumbas engaged in the industry take to it only as a subsidiary occupation. The second reason is dearth of raw material. The absence of sheds to protect the workers from rain and cold is another reason for the industry not being carried on during the rainy and cold seasons.

331. The economics of the industry are given below :—

I. *Cumblies*

(i) An ordinary cumbly 7 cubits, 1 span by 5 spans (i.e., 11′ 3″ × 3′ 9″) weighing about ¾ to 1 viss with gunji (Guntur)—

	RS.	A.	P.
Cut wool—warp 3 seers, weft 1¼ to 1½ seers ..	2	0	0
Spinning charges	0	12	0
Sizing material	0	1	0
Weaving	1	0	0
Cost of production	3	13	0
Present price	5	0	0
Margin of profit	1	3	0

A family consisting of a husband, wife and child can make one ordinary cumbly a day.

(ii) Kurnool district—

The cost of production of a labourer's cumbly including wages is about Rs. 6-2-0. It is sold to the ultimate consumer at Rs. 7-8-0, the middlemen getting a profit of Rs. 1-6-0 per cumbly.

(iii) Kistna district—

For a carpet of 6′ × 3′—

	RS.	A.	P.
Woollen yarn (12 lb. including grey yarn) ..	4	0	0
Dyeing charges	0	8	0
Cotton yarn 6s	1	6	0
Weaving charges	1	14	0
Cost price	7	12	0
Sale price	8	0	0
Margin of profit	0	4	0

(iv) Anantapur—

Cost of wool	3	6	0
Carding	0	2	0
Tamarind seeds	0	1	0
	3	9	0

The remaining work of warping, sizing, weaving and finishing is done by the weavers. The price at which the cumbly is sold to middlemen ranges from Rs. 5 to Rs. 5–12–0. The price that the ultimate consumer (a labourer in the tea or coffee estates) pays after the cumbly passes through the hands of the supplier in the estate will be about Rs. 6–8–0 to Rs. 7–8–0.

(v) West Godavari—

	RS.	A.	P.
Spun wool 3 lb. at 8 annas a lb.	1	8	0
Wages (weaving)	0	10	0
	2	2	0

Sold to the middlemen at Rs. 2–2–0 to Rs. 2–4–0.

He sells it to others at Rs. 2–8–0 to Rs. 3.

It reaches the consumer at a cost of Rs. 2–12–0 to Rs. 3–4–0.

About As. 8 to As. 12 will be received by men weaving and As. 6 to As. 8 by women spinning. The daily income of a worker in the industry varies in different places. It ranges from As. 8 to Rs. 1–4–0.

II. Pile carpets

Cost of one square yard of the 4½ threads of local variety in Ellore Pile Carpet Weavers' Co-operative Society—

	Pre-war.			At present.		
	RS.	A.	P.	RS.	A.	P.
Cost of woollen yarn 5 lb.	2	5	6	5	10	0
Cost of cotton 10 ounce	0	4	2	0	7	8
Cost of jute	0	3	1	0	10	6
Weaving charges	1	6	0	4	0	0
Overhead charges		..		3	0	6
Margin for society	0	5	3	1	12	0
	4	8	0	15	8	8

By using tannery wool the cost of production is reduced to about Rs. 9-9-0 per square yard. The master weaver sells the carpets at Rs. 10 per square yard to merchants who in turn sell them at Rs. 15 to Rs. 16 per square yard. The daily income of a weaver working for wages is Rs. 1-4-0 to Rs. 1-8-0.

Fibres

332. The fibre industry is one of the important cottage industries in the Province providing the rural population with a subsidiary as well as a whole-time occupation. Various products are manufactured out of coconut, hemp, palmyra and aloe fibres. The articles usually manufactured from coconut fibre are coir yarn ropes for home and farm use such as ropes for drawing water, halters, for cattle, for fencing and for holding together thatched sheds; ropes for "Kapilais", for corking the bottom of boats; rope mats; matting brushes and brush mats. The articles made of hemp fibre are coarse; they are used for canvas chairs, for spreading on the floor, for gunnies and as ropes. Palmyra fibre is generally exported to foreign countries where it is used for making brushes. Aloe fibre is largely used in korai mat weaving as warp.

Coir or coconut fibre

333. The coir industry is one of the principal cottage industries of South India and has been in existence from the fifteenth century. In India, the coir industry on a commercial scale exists only on the West Coast and it is best developed in Travancore. The district of Malabar, the main centre of coir production in this Province, is next in importance. Certain pioneer European enterprises made the West Coast their chief seat of this industry and over a quarter of a century it was practically a monopoly in their hands. Due to their efforts and the availability of natural facilities such as plenty of raw materials, retting facilities and cheap water transport and labour, the West Coast has become more or less the home of this industry. Other parts of the Province have made little progress though coconut grows abundantly in several places, in the districts of East Godavari, Tanjore, Salem, North Arcot, Vizagapatam and Coimbatore. In these areas some sort of rope or cordage is made to meet the local demand for ropes for domestic and agricultural purposes. The chief reasons for the non-development of the industry in these areas are (1) ignorance as to the uses of the husks, (2) absence of natural facilities for retting and (3) the laborious processes involved in spinning. The raw material available in the Province is sufficient to produce 180,000 tons of coir per annum but only about 25,000 tons are produced and about fourteen per cent of the material alone is utilized. More than a lakh and a half of people are engaged in the industry and of these about ninety per cent are women who work in-doors by preparing the fibre for coir production. In most areas only the unemployed take up this work. The industry as it is organized at present in this Province

is quite unremunerative as the workers who work very hard get, on a rough estimate, about 25 per cent of the consumer price and the rest goes to fill the pockets of about half a dozen intermediaries who operate between the producers and consumers. The labour charges for pitting and earthing 1,000 husks amount to 8 annas. The net earning of a woman working about eight hours a day for converting husk into yarn ranges from half to one anna and a woman spinner earns only one to two annas a day. A man engaged in rope making gets four annas a day and a woman or a boy only two annas.

334. The popularity of coir fibre as a rope making material is due to the fact that it is slightly liquefied, is elastic and withstands the action of water exceedingly well. It is supposed to wear better in sea water than iron chains which get oxidised when immersed by the action of sea water. Coir cables are therefore of great value in ships. Coir is used as packing material and the yarn and rope made of coir are used in bundling, netting, erection of temporary sheds, roofings and pandals, drying of tobacco, sugarcane propping, scaffolding, drawing water from wells, mhoting and for service in carts and boats. It is however not useful as a textile material on account of its coarseness, harshness, brittleness and colour.

335. The raw material required for the industry is obtained from the green husks of the coconut which is not fully ripe. In coir centres, coconuts are gathered when they are 10 to 11 months old and just before they are fully ripe. The husk is peeled off by striking the nut against a pointed end of a steel or wooden spike firmly planted in the ground. Coir is obtained from these husks after treating them. Retting is an important process connected with the industry and on this depends the quality of the coir extracted. In the West Coast husks are soaked in pits dug out on the borders of back-waters or in the gardens where they get water on the surface and the material is kept under water for eight to ten months covered with leaf fronds and mats with heavy stones placed on the mass to keep it below the surface. Properly retted fibre will be golden yellow in colour. Retting is also done in fresh water in other parts of the Province. In East Godavari, Tanjore, parts of Ramnad and Salem the dry husks are soaked only for a few hours in fresh water. In some other places the husks, are boiled and this is said to be more effective than a few hours soaking. After retting is completed, the husk are rinsed in fresh water to free them from dirt and mud and when dry, are beaten on a block of wood with a mallet to separate the loosened pith from the fibre. Retted husks should not be exposed too long in the sun as otherwise they will get dried up and the colour gets darkened. In some centres fibre is extracted from unsoaked green husks also. Fibre is cleaned in some places by spilling over it water mixed with tamarind flower powder and beating it with a stick, so as to make it white. After extraction

the fibre is sized in a small winnowing machine in Anjengo but this is done mostly by hand in Malabar and South Kanara. The use of this machine straightens the fibre and makes it soft. Twisting of yarn is mostly done with hand as a cottage industry by women. To a small extent the fibre is also twisted with the aid of a spindle or charka. In this Province the use of the machine for spinning is confined to a few factories in Malabar. Almost all the coir goods exported from Malabar are of handspun yarn. Rope making is mainly carried on in the Cochin State and in Malabar it is done only on a small scale. This industry is carried on in the districts of South Kanara, East Godavari, Ramnad, Chittoor and Salem to some extent. Mats and mattings have been developed to a large extent in the Travancore State.

336. In Malabar, the industry is mainly in the hands of capitalists and the workers are wage earners. In South Kanara, all the members of a family except the chief man usually work on the industry. The raw material is available in the gardens of the workers. Sometimes the workers take small cash advances from local middlemen for the purchase of raw material on condition that the finished product will be sold to them. A part of the finished product is sold to local consumers and the balance is sold to local merchants who in turn sell them to bigger merchants. In Ramnad district the workers carry on the industry with their own funds and the coir goods are sold generally within the district. In Tinnevelly, the workers usually work as coolies under middlemen who send the coir goods for sale to Trichinopoly, Bombay, Karachi and Mysore State. In Vizagapatam district, the workers do not generally borrow funds for the industry but occasionally borrow from the middlemen with the stipulation to repay the advance in kind. The bulk of the goods is exported outside the district to Calcutta, Orissa Province and the Central Provinces. Calcutta is usually the largest buyer of coir rope. In Tanjore, Trichinopoly, East Godavari, Chingleput, Salem and North Arcot districts, the workers carry on the industry with their own funds and the output, being comparatively low, is consumed locally.

337. The economics of the industry vary from place to place on account of varying prices of the husks in different places. The following are the economics of the industry as carried on in the Tinnevelly district. (Unit, one bundle containing 96 hanks of coir yarn of 15 scores) :—

	RS.	A.	P.
Cost of raw material	24	0	0
Cost of materials for soaking the husks	1	8	0
Labour charges	3	8	0
Cost of 1,000 soaked husks	29	0	0
Sale price of 1,000 soaked husks	34	0	0

	RS.	A.	P.
One bundle of coir yarn of 15 scores require 87½ soaked husks at Rs. 34 per 1,000	3	0	0
Charges for removing the soaked husks from pits at Rs. 1–4–0 per 1,000	0	2	0
Cost of transport from pits to the places of the workers at Rs. 1–4–0 per 1,000	0	2	0
Beating charges for 87½ soaked husks at Rs. 5 per 1,000	0	7	0
Winnowing charges at Rs. 3–8–0 per 1,000	0	5	0
Spinning	0	14	0
Cost price of coir yarn of 15 scores	4	14	0
Wholesale price to middlemen	5	6	0
Retail price to consumers	6	0	0

The average daily income of a worker in the industry is about 8 annas for children who assist the weavers and spinners, Re. 0–10–0 to Re. 0–14–0 for men and women spinners and Rs. 2–8–0 to Rs. 3 for men engaged in weaving.

Before the war, Malabar, Cochin and Travancore exported coir manufactured articles to almost all the countries of the world and unmanufactured coir to many of them. Germany was the largest importer of manufactured yarn. United Kingdom, Netherlands, Belgium, France, United States of America, Burma and Italy also took considerable quantities of yarn. After the commencement of the war, the United Kingdom was the largest importer. The trade however dwindled due to want of export facilities. Now that the war has ended, the foreign exports will once again commence and increase in proportion to the shipping space which will be made available.

338. The total extent under coconut cultivation in the Province is a little over 600,000 acres which represents 39 per cent of the area under such cultivation in India. The output of nuts in this Province is about 1,800 millions per annum and on the basis of 10,000 husks for a ton of coir, 180,000 tons of coir can be produced if the entire raw material is utilized. As it is, the present production is only 25,000 tons which means only 14 per cent of the husks go into the production of coir. In the Malabar district only 20 per cent of the husks is utilized for the industry. Though facilities for retting and spinning, cheap labour and water transport are available in abundance in that district, the industry has not made much headway. The defects noticed in the present state of the industry are many and varied. Most of the raw material available in the Province does not go into production for want of the necessary knowledge and facilities. In the matter of manufacture and marketing of coir fibre and its products, much propaganda and scientific research are required. The methods now adopted are crude and even the improvements already made in Travancore are

not copied in Malabar. The following are the methods which should be adopted to improve the industry :—

(1) At present people who deal in coconuts pluck them only when they are fully ripe and dehusk them after a long interval They should be made to realise, by propaganda, how they can aid the industry and supplement their incomes at the same time by plucking the nuts before they become fully ripe, dehusking them immediately and either retting the husks or disposing of them to the people engaged in the business of retting.

(2) Necessary attention is not paid at present in the matter of making pits (for retting the husk). In some places in the West Coast where natural facilities exist, pits are not dug sufficiently deep and further they are not dug in the immediate foreshore of rivers. For want of sufficient depth in the pits the layer of mud on the husk is washed away by the tide in a month or two after pitting, exposing it to the sun. If the pits are not dug in the immediate foreshore, the tidal waves do not reach the pits, which is necessary to remove the products of fermentation and this spoils the colour of the fibre. The pits should therefore be sufficiently deep and dug on the immediate foreshore of rivers.

(3) The beating of the husk to extract fibre requires improvement. A good deal of fibre is at present allowed to go to waste.

(4) The fibre is not seasoned at present. It should be thrashed well and dried. Skilful carding should be adopted by introducing the willow machine which is now in extensive use in Travancore. Training of workers in working the machine is not difficult and with proper training they can acquire the skill within six months.

(5) At present spinning is done mostly by hand. The spinning wheel should be introduced. Though it is true that we now get very superior yarn by hand spinning, the employment of manual labour in all the stages results in high cost of production and consequent failure to command speedy and profitable sale. Travancore has grown wheel-minded and Cochin is speedily taking to it. There is no reason why Malabar should not follow suit. Wheels increase production and improve the quality of the yarn. Further, wheels afford division of labour and create specialized labourers with the result that the entire industry can be raised to the status of one giving full time employment in its different branches to a large number of people, instead of continuing as a subsidiary industry attended to during leisure hours.

(6) The manufacture of rugs, mats and mattings in the Province is negligible. Travancore has advanced considerably in this field. With the introduction of spinning wheels and with the better methods of retting, a good quantity of superior variety of yarn can be made available for the manufacture of rugs, mats and mattings in Malabar also.

(7) There should be continuous scientific research into the various processes connected with the industry in order to find out

labour saving devices and machinery. Laboratory trials have indicated that the period required for retting could be shortened by soaking the husk until the bacterial growth is established and then lifting the husks and after crushing between heavy rollers returning it without delay to the soaking pits. In this way good quality fibre can be obtained in less time. This process has not however been popularized.

(8) In the matter of marketing the products, the present methods require considerable improvement. There are about half a dozen intermediaries between the producers and the consumers, with the result that the intermediaries pocket 75 per cent of the consumer's price paying only about 25 per cent to the producer. Very often the village shopman who takes the coir-yarn in exchange for his condiments pays 15 to 20 per cent less than the merchant. Most of the workers are illiterate and poor. Organization of co-operative societies for the workers and for purchasing the yarn from the workers at important centres will go a long way in enabling the producers to get a fair share of the selling price.

(9) In the sale of coir yarn the greatest defect noticed is the absence of standard specifications though the trade recognizes in a way certain varieties named after the localities of their production. Beypore, Quilandy and Kadulundy are some of the commonly recognized varieties subdivided further into grades. These grades however are neither uniform nor does the producer know anything about them. The European firms in whose hands the trade is concentrated get their supplies through the Indian merchants sort them according to colour and quality and fix the prices. They grade the yarn. The matting industry in Travancore has a system of standardizing yarn by score numbers but this is also defective as it gives room for manipulation.

339. In connexion with the training of coir workers, a demonstration class was started in July 1937 in the Kerala Soap Institute, Calicut, with ten stipendiary students most of whom were deputed by the local coir working establishments. The training was so successful that in the All-India Khadi and Swadeshi Exhibition held at Calicut the students secured certificates of proficiency and a gold medal for the excellence of coir carpets produced by them. The demonstration class was re-opened at Beypore in May 1938 with 12 students for training in the various processes of manufacture of coir. Most of the students became capable of spinning yarn comparable in quality to that of reputed brands produced by experienced workers of Anjengo and Travancore. Training in weaving and in the manufacture of ropes, brushes and brooms was introduced. A Co-operative Inspector underwent training in this school to acquaint himself with the technique of the industry and he also visited coir working centres in Cochin and Travancore to study the methods adopted there. Subsequently he was instrumental in starting a co-operative society in Pavarathi, a large coconut producing centre. The training of

students is still being continued in the school at Beypore and teachers are also given training in the industry so that they may teach their pupils. The syllabus in this school has recently been revised providing for a two years' course in spinning and weaving coir. The number of students to be admitted for the first year course has been increased to 40 and that for the second year to 20.

The use of the willowing machines and spinning wheels and charka spinning have been demonstrated in various centres and the machines, wheels and charkas modelled on those in use in Travancore have been supplied to various co-operative societies organized in the Malabar and Ramnad districts. The Beypore school is also equipped with them. Five centres for training of the Burma and Malaya evacuees have already been opened and are working at Cannanore, Quilandy, Tellicherry, Badagara and Ponnani in the West Coast and they have been supplied with necessary machinery. Co-operative societies for coir workers have also been started at various places. Demonstrations of coir production and manufacture of articles from coir have been made at various centres in the West Coast, Ramnad, Madura and Tanjore districts for the benefit of the workers interested in the industry. Now that the war has ended, demonstrations in places in the Chingleput and North Arcot districts which have been held over will be conducted, to enable the people to understand the technique and take to the industry.

The Government have also sanctioned the starting of three coir factories, one in each of the Malabar, South Kanara and East Godavari districts for the production of coir stores. The factories will arrange to obtain coir yarn from village yarn units to be organized for the production of charka yarn as in Travancore.

Palmyra fibre

340. Next in importance to the coconut fibre industry comes the palmyra fibre industry. It is carried on in the Tinnevelly, Vizagapatam and West Godavari districts. These districts have developed an extensive trade in the extraction of fibre and its export to foreign countries. In the East Godavari district, it is pursued on a small scale in the Cocanada and Peddapuram taluks. In the Tinnevelly district, people belonging to the Nadar Community are engaged in the industry. In the Vizagapatam district, Yethas and Malas and in the West Godavari district, Malas, Madigas, Yedicas, fishermen and Kapus are carrying on the industry. The industry requires practically no capital, as the sheaths or stems of palmyra leaves are available free or for a nominal price. It is carried on chiefly as a subsidiary occupation all through the year and on a large scale after the harvest in the fields. The fibre is extracted from the sheaths by beating it out with a stone or wooden hammer. The workers confine themselves in most of the villages to the conversion of the sheaths into fibre. They do not attempt to make any product out of the fibre. They take the raw fibre to the shandies or the village merchant goes round and collects the fibre accumulated by several workers.

The village merchant sells it to the wholesale dealer who in turn sells it to the agents of exporting firms. The further process of cleaning, drying, combing, assorting and dyeing is done on a cottage industry basis in towns like Cocanada, Yellamanchili and Anakapalle. In some places like Cocanada, the fibre is combed on nails with sharp pointed ends fixed in 2 or 3 rows to a wooden plank. Sometimes, the fibre is combed and then dyed black. The dyed fibre is assorted and bundled and made ready for export. The bulk of the product is exported to foreign countries. Tuticorin and Cocanada are the chief ports of export of the fibre.

341. Most of the persons engaged in the industry are unskilled labourers. They are not usually indebted to the merchants or middlemen. A person engaged in the industry earns about 6 annas a day on an average. The chief handicaps of the industry are the following: (i) efforts are not taken to convert the raw fibre into finished products and to earn higher incomes thereby; but is practically sold in a raw condition for being exported to foreign countries; (ii) there are a number of middlemen thriving at the expense of the villager, appropriating a large share of the price paid for the fibre by the exporting firms; and (iii) the workers, by selling the fibre without proper cleaning, combing and dyeing, get low prices. It is only in Tuticorin that a small portion of the fibre is converted into finished products like brushes, doormats and brooms. An attempt was made by the Anjuman Industrial School, Madras, to manufacture brooms and brushes and it is understood that difficulty was felt by this institution in finding a sale for them. The South Indian and Madras and Southern Mahratta Railways generally use such brushes for cleaning railway carriages. Many of the bus owners also use brushes for cleaning the floors of the buses. Commercial firms and banks also use brooms and brushes made out of palmyra fibre. Several of the households in Madras City and other important towns will buy fibre brooms and brushes if there is sufficient advertisement and propaganda. Co-operative Societies can be formed for the workers in places where they are concentrated and can undertake the cleaning, combing and dyeing of the fibre. Government assistance by providing capital and technical assistance will be necessary for these societies till they are able to support themselves.

Hand-made paper

342. Paper making as a cottage industry flourished in India for centuries from the time of the Mughal Emperors up to the middle of the nineteenth century. It was introduced in India by the Mughal travellers who had learnt it from the Chinese. After the advent of machines for the manufacture of paper, the production of hand-made paper gradually declined. In this Province Nyamadala, a village 15 miles from Dharmavaram in the Anantapur district, was once a seat of manufacture of rough paper. The industry was in a flourishing condition before the advent of fine paper from

Bombay. It declined gradually and disappeared altogether about 35 years ago. In June 1938, ten candidates were deputed for training in the short course of instruction in paper manufacture provided by the All-India Village Industries Association at Wardha. After the return of the students from Wardha in December 1938, the Government sanctioned the opening of two training centres in paper making, one each for the Tamil and Telugu areas, the classes being attached to two recognized industrial schools, viz., the Harijan Industrial School, Kodambakkam near Madras and the Bharadwaj Ashramam, Peddakadubur, Bellary district. These centres were given a special grant by the Government to meet the expenditure involved and the classes were placed in charge of the men trained at Wardha. Two other industrial schools, one at Rajahmundry, and the other in Malabar started, on their own initiative, by employing the men trained at Wardha. In 1939-40 though the special grant was withdrawn, the classes continued in the schools under the ordinary provisions of the Code of Regulations for Industrial Schools. In 1940-41 there were paper making classes in six recognized schools. During this year the Government sanctioned a grant of Rs. 30 each, to four ex-students of the Harijan Industrial School, Kodambakkam and the Bhadrawaj Ashramam, Peddakadubur, for starting the industry at (1) the Aziznagar Settlement, Oomangalam, South Arcot district, (2) Adoni, Bellary district, (3) Kristipadu, Anantapur district and (4) Rajaji Rural Reconstruction centre, Vengapalle, Chittoor district. The Government directed that certain of the Government offices in these four districts should conserve their stock of waste paper for the use of the students in the manufacture of hand-made paper. The Government also sanctioned a scheme for the development of the hand-made paper industry, which provided for the constitution of two parties to demonstrate the manufacture of hand-made paper in several centres of the Province and the appointment of a supervising demonstrator with headquarters at the Leather Trades Institute, Madras, to examine the different raw materials which could be used for paper making with reference to the cost of such materials, the ease with which the pulp could be prepared and the kind of paper for which the raw material could best be used. In the course of his tours, the supervising demonstrator was to indicate to the demonstration parties the raw materials which had been found suitable and demonstrate any special treatment required. The Government have also set up three hand-made paper production units at Bezwada, Gazulapalle in the Kurnool district and Bugga in Cuddapah district. In addition to these three units the industry is carried on at present by the Vizianagram, Chicacole, Nandigama, Chennaraopalem, Cuddapah and Guntur hand-made paper making co-operative societies, the Srivilliputtur Cottage Industries Co-operative Society, the Walajahbad Hindu Religious Cottage Industries Co-operative Society, the National College, Masulipatam and the Grandhalaya press at Bezwoda.

Raw materials

343. Cellulose is the main raw material for paper manufacture. It is found in trees, plants, creepers, grasses and roots and such of these as have plenty of cellulose are best suited for paper making. Paddy straw, botha grass, jumbee grass, manjum grass, korai, sunnhemp and bamboo are a few of them. Waste paper, rags, old jute bags, cuttings from tailors and mills, can also be used for paper making. In fact paper can be made out of any vegetable fibre matter. The other raw materials required are caustic soda or slaked lime, bleaching powder, dyes, fuel, sizing materials (starch, rosin, china clay, glue and soap) and pure water. The appliances used generally are vats, tubs, a drum, a denki, mould with wire gauze, a table, two wooden planks, a hard press, polishing stones and woods and an iron sieve. In larger paper units, a cutting machine, a mortar, a pulp beater, a water squeezing machine, a hard press and a glazing machine are used. The preliminary process consists in gathering waste paper, old and worn out ropes and rags, mixing the materials with caustic soda or slaked lime in proper proportion and allowing the mixture to soak in water in a vat for about two days. If the raw materials are vegetable matter, the mixture is well boiled and then left for two days to soak in water. Then the mixture is converted into pulp and the pulp bleached with bleaching powder. The bleached pulp is washed with pure water so as to remove all dirt and the smell of the bleaching powder. If coloured paper is required the required dye is added to the pulp in proper proportion. The pulp is then removed to another vat, water is added and the mixture filtered in the vat itself with a fine sieve so as to remove all materials which have not been well pounded. When this has been done, the pulp is ready for producing paper. With a wooden frame having a wire gauze mesh the pulp solution in the vat is taken over and moved by hand movement so as to leave the thick sediment evenly over the frame. The sediment is the wet paper and it is transferred to a squeezing machine to squeeze water from it. Each paper is then put up against a wall and is allowed to dry for two days. On the third day either glue, rosin or hot rice paste is smeared over both sides of the paper. After a little drying the sheets of paper are pressed in a press so as to remove all shrinkages. Then they are glazed by hand with a smooth leg of wood or stone or couch or in a glazing machine. The edges of the paper are trimmed and the paper is cut to the required size. The economics of the industry, as carried on by the Nandigama Hand-made Paper Making Co-operative Society in the Kistna district, where production is large, is as follows:—

For producing two reams of paper per day—

	RS.
Cost of raw materials and chemicals	5
Labour charge (16 labourers at 10 annas each) ..	10
Total ..	15

	RS.
Selling price of two reams of paper at 8 annas per quire.	20
Gross profit per day	5
Gross profit for one month (25 working days excluding 5 days allowed as holidays)	125

Profit and loss account

Loss.	RS.	Profit.	RS.
Pay of technician	40	Gross profit	125
Clerk	25		
Rent for office	5		
Depreciation on building and machinery, costing Rs. 6,200 at 8 per cent per annum ..	42		
	112		
Net profit ..	13		
	125		125

344. In view of the various items of work involved in the process of manufacture of hand-made paper, it may not be possible for a single man to produce hand-made paper as a means of earning his livelihood. But as a domestic subsidiary occupation for villagers and agriculturists all the members of a house contributing to the labour in one way or another, it would seem to have considerable value especially as a wide range of raw materials is available in the Province.

Co-operative societies for hand-made paper making are of recent growth. There are at present six such societies in the Province, two at Vizianagram and Chicacole in the Vizagapatam district, two in the Kistna district and one each in the Cuddapah and Guntur districts. The societies are still in their initial stages. As the paper produced by this industry has to face the competition of machine-made paper, it is necessary that the quality of the paper should be high and the cost of production should be as low as possible. Co-operative societies for the development of the industry can be organized in more centres and worked satisfactorily, if the Government provide the necessary technical and financial assistance to the societies in the initial stages. The chief difficulty which hand-made paper societies have been experiencing is in the matter of marketing the paper produced. The local bodies and the Government consume large quantities of paper and if only a part of their requirements is purchased from the hand-made paper workers and co-operative societies there are possibilities of developing the industry. Japan has specialized in art hand-made paper. This is the obvious approach to avoid competition from the mills. Though

it may take time for hand-made paper making units to reach a high standard in the matter of producing writing paper, the units can now supply rough artistic paper for wrappers, envelopes, card boards and blotting paper and paper for printing purposes. Local bodies and the Government can also supply waste paper from their offices free or at concessional rates to these institutions.

Metal industry

345. Working in metal has been for a long time an important cottage industry in the Province. A variety of goods including domestic utensils, ornamental wares such as flower vases, ash trays, lamp stands, idols and toys, and scores of other useful articles are made of metal. Vessels made of brass, copper, bronze, bell-metal and lead are used in varying numbers according to means in many households. These metalwares are preferred not only on account of their appearance, but also for their durability and utility. The industry is pursued as a cottage industry or as a small workshop industry chiefly by certain communities like Viswakarmas, the Viswa Brahmans, the Kammas and the Kammalars. It is also pursued by Muslims and Woddars in Vonipenta in the Cuddapah district, Kapus in the Nellore district and Goanese Christians on the West Coast. In every town and many important villages in the Province a few artisans of this class can be seen. The 1931 census showed that there were 13,218 persons engaged in brass, copper and bell-metal work. They attend to the repairs of old vessels and to the manufacture of new ones; but the industry is carried on on a large scale only in a few towns and villages where the more skilled among the artisans are concentrated. The reasons for such concentration are the markets created for the wares by the large gathering of pilgrims, who visit these centres, the facilities for getting fuel cheaply and the presence of persons who finance the industry. The chief industrial centres are Vellore, Arcot, Timiri (North Arcot), Satravada and Kalahasti (Chittoor), Anuppapalayam (Coimbatore), Vonipenta (Cuddapah), Conjeeveram and Tirukalikunram (Chingleput), Rajahmundry, Dowlaishweram, Tallerevu, Dwarapudi, Anaparti, Mamidada, Samalkota, Peddapuram, Maripudi, Chitrada, Pithapuram, Mamidipaka, Kottepalli, Rajanagaram, Tuni and Cocanada (East Godavari), Penugonda, Azzram and Palacole (West Godavari), Ramanakkapet and Mylavaram (Kistna), Kasaragod, Udipi, Bantwal, Angalli, Karkal, Mangalore and Puthur (South Kanara), Nilakottai and Dindigul (Madura), Komaleswaranpet, Chintadripet, China Bazaar and Rayapuram (Madras), Muthunaickenpatti, Salem, Rasipuram, Kattunaickenpatti, Ariyakavundanpatti, Oduvankurichi and R. Pudupalayam (Salem), Tinnevelly, Pettai, Vadakangulam, Sankarankoil, Eral, Tenkasi, Vagaikulam and Tachanallur (Tinnevelly), Kumbakonam and Nachiarkoil (Tanjore), Venkatanaickenpatti, Sirugambur, Lalgudi and Jayakondan (Trichinopoly), Kotapadu, Parvatipur, Bobbili, Anakapalle and Somalingapalem

(Vizagapatam) and Quilandy and neighbouring villages and Palghat (Malabar).

346. The industry is in the hands of capitalists in almost all places and they control both production and marketing. Very few artisans carry on the industry with their own funds or market their goods independently. This is because the articles produced which are comparatively costly are neither marketed locally nor quickly and the artisans are unable to contract business relations with distant places and are too poor to provide their own capital. Where, however, new vessels are made with scrap material, they purchase the old vessels themselves and make new vessels independently. They sell such goods locally to the consumers direct or to the merchants. But such cases are few. The industry has been organized on a factory basis in Madras and Kalahasti where machinery is used for manufacturing vessels. In other places, the work is carried on by the workers in small workshops or in houses. The organization of the industry by the merchants is of two kinds. One is where the workers are supplied with metal by weight and the finished products are got back by the merchant after paying wages to the workers on the basis of the size, the quality of work, and the time involved. The workers do the work in the workshop of the merchant or in their homes. If they work in the workshop, the employer provides them with charcoal and implements. If the workers do the work in their homes, the wages paid cover the cost of fuel also. The other method is where the merchant deals with master workers who in turn engage the workers to manufacture the articles. The master workers are paid on the basis of the articles made while the actual workers are paid wages either on a time basis or according to the articles made. In certain places like Kumbakonam, the traders hand over the raw material to the workers along with one half or three-fourths of the wages in advance and the latter are expected to make the articles in their homes and return them to the trader. Invariably the workers do not return all the goods with the result that the balance due is debited as a loan against the worker. This practice is largely responsible for the indebtedness of the workers. The daily income of a worker ranges from Re. 1 to Rs. 2-8-0 depending on the workmanship.

347. The raw materials, which consist of brass, copper, tin, lead, aluminium and iron are imported from abroad. Copper is used in the West Coast, Madras, Cuddapah and Tanjore districts. Brass is used in Tinnevelly, West Godavari, North Arcot, Coimbatore, and Trichinopoly districts. Both brass and bell-metal are used in Chingleput, Vizagapatam, East Godavari and Chittoor districts. Aluminium is largely used in Madras, Rajahmundry and Vizagapatam. Bronze and bell-metal are largely used in Dindigul, Nilakottai, Palghat, Kumbakonam, Lakavarapukota, Kotapadu and Parvatipur. Lead is used in making culinary vessels in Tanjore and Vizagapatam. Apart from importing metal sheets, old

broken and unserviceable vessels and utensils are purchased generally at half the price of the new metals, melted and used in casting moulds and in making bottoms of culinary and other vessels which wear away by constant use. Articles of steel and iron are made at Dindigul (Madura), Penugonda and Palacole (West Godavari) and Rajahmundry, Dowlaishweram and Tallarevu (East Godavari). The ordinary furnace with country bellows and the anvil and the hammer are in general use. Machines or improved tools are rarely used. The worker acquires the knowledge as an apprentice under his father, relative or other workers. Metal sheets are hammered on anvils by hand to the required shape. A vessel is thus beaten out in two or three parts and the parts are later soldered. Metal goods are also produced by pouring melted metal in earthen moulds of the required shape and dimension and then by filing, turning and polishing them. A large variety of articles are made of metal. Each class of artisans specialise in making particular wares. The chief wares made with brass are 'Kudams,' 'bindas,' 'tapillas,' 'thambalams,' 'vanachatis,' 'chembus,' 'andas,' cups, coffee filters, 'adukkus,' meals and tiffin carriers. Those made with bell-metal are "screw chembus," tumblers, cups, trays, bells, beads and "kuthivilakkus". The common lead vessels or "chembus" are used for culinary purposes. In Quilandy, in the Malabar district, articles of an ornamental kind and of high artistic beauty such as "hookas," lamp stands, flower vases, ash-trays and cups and finger bowls, are made. Such ornamental metal work is done also in Vedakangulam in the Tinnevelly district. Iron safes and locks are made in Dindigul, Penugonda and Palacole. Steel trunks and buckets are made in Penugonda and Palacole. Malabar blacksmiths are famous for making articles of cutlery. The Palghat and Quilandy knives are famous. Pruning knives, table knives, clasp knives and scissors, made in Malabar are largely used in the other districts.

348. The actual workers are not faced with the problem of marketing, as they are mostly working for wages under master workers or merchants. The merchants generally regulate production with reference to the normal demand. The merchants sell their articles locally in their shops or export them to important towns where they open branches or appoint agents or contact merchants and sell the goods for cash or credit. The important markets are generally large cities and towns and places of pilgrimage and festivals, where there is a large concourse of people. There is demand for the goods throughout the year and especially during the marriage season and at the time of festivals like Deepavali and Pongal. If the workers themselves produce as owners, they take them to neighbouring villages and shandies and hawk them. Sometimes, the agents of merchants in towns visit the centres of production and purchase the articles from the workers. Marketing does not generally present much difficulty.

349. As a variety of articles are produced with varying workmanship and skill, it is rather difficult to furnish the economics of the

industry common to all such articles. The following are the economics of the industry in respect of an ordinary brass vessel without much workmanship or skill :—

	RS.	A.	P.
Cost of 30 lb. of brass sheets at Rs. 1-8-0 per lb. ..	45	0	0
Cooly	8	0	0
Charcoal	3	0	0
Vengaram..	0	8	0
Moosai	0	8	0
Kongilian, rojanam and copper sulphate	1	0	0
Wages to the helpers	3	0	0
	61	0	0

Cost price of the vessels weighing 30 lb. is Rs. 61.
Cost price per lb. is Rs. 2–0–6.
But the merchant sells at Rs. 2–5–0 per lb. (controlled price).
Margin of profit per lb. is Re. 0–4–6.

The merchant generally charges 4 annas to 8 annas per lb. over the cost of the metal for cost of production according to the kind of brassware.

350. Co-operative Societies for metal workers have been formed at Vonipenta in the Cuddapah district, at Satravada in the Chittoor district, at Vemur in the Guntur district, at Peddapuram and Rajahmundry in the East Godavari district, at Azzram in the West Godavari disitrict, at Ramanakkapeta in the Kistna district, at Quilandy in the Malabar district and at Nachiyarkoil in the Tanjore district. Co-operative Societies formed for the workers can purchase the required machinery and keep it in the common work room of the society where members can come and make use of the machinery. For instance, the societies can set up a polishing lathe and an electric apparatus for soldering and the members can take their goods to the society and use the machines for a nominal cost. Co-operative Societies can also provide continuous employment to the workers. There are possibilities of organising co-operative societies for metal workers at Pettai Vedakangulam and Eral (Tinnevelly) Muthunaickenpatti, Rasipuram and Oduvankurichi (Salem), Vellore (North Arcot), Nilakottai and Dindigul (Madura), Kumbakonam (Tanjore), Anakapalle, Parvatipur and Kotapadu (Vizagapatam). The societies will require assistance in securing raw materials and machinery and in some cases financial assistance for setting up the machinery.

351. The chief difficulty of the artisans is in the securing of raw material. Owing to the high cost of metal and their own poverty, the artisans are generally unable to carry on the business independently. This largely accounts for their working under a master worker or merchant for wages. They are generally indebted to the master worker or merchant. In view of this they lack initiative and enthusiasm to improve their designs and methods of manufacture. For the improvement and development of this

cottage industry Government assistance will be necessary in the following directions. The raw material including charcoal should be purchased and supplied to the artisans. Instruction in improved methods of manufacture with a view to avoiding wastage in metal and labour and in improved designs should be given. A judicious combination of human skill and machine labour will greatly improve the industry and make production cheaper. This is an industry where there are possibilities of introducing small electric motors, polishing lathes, and soldering with electricity. The Government School of Technology, Madras, provides a one-year course on light metal casting, where instruction is given in the preparation and manufacture of articles of brass and other metallic alloys using modern moulding processes. Similar instruction is also given at the Government Industrial and Trade Schools in the mufassal.

Wood-work

Furniture making

352. Furniture making is largely an urban industry. Every important town has a number of furniture makers. But the industry is carried on on a large scale in Malabar, South Kanara and Madras. Kallai (Malabar) is the most important centre where furniture of all kinds is made. The workers belong to the Asari caste of carpenters and are employed by capitalists on daily or monthly wages. Each carpenter earns from Rs. 2 to Rs. 4 a day. Except in Madras, the industry is localized in places where teak and other varieties of wood usually used for furniture-making are readily available. The industry is in existence in almost all other districts also on a smaller scale. It is in the hands of capitalists in most places, and the workers are engaged mostly on a contract basis. The workers have their own tools and instruments which are simple. The finished product is usually marketed by maintaining a show room. Furniture-making requires a good deal of capital, as the wood has to be purchased a year or two earlier for seasoning purposes. Hence it is that the industry is organized as a workshop industry by capitalists and little scope is left to independent artisans. The workers can be organized into co-operative societies but they will not be able to contribute sufficient capital required for the industry and financial assistance from the Government will be necessary. It will also be necessary for local bodies to encourage these societies by placing with them orders for their requirements of furniture, for their offices and the schools under their control.

353. Camp furniture is manufactured at Narasaraopet in the Guntur district and the goods produced at this place have won more than local name. The camp furniture of this place used to be exported to Madras, Bangalore, the Ceded Districts, the Hyderabad State and the Punjab. There is only one workshop with about 10 workers now. The workers are all on either a monthly or a daily wage basis and the average wage per day for a worker ranges from Rs. 2 to Rs. 2-8-0. The annual output is estimated at about

Rs. 25,000. The industry had a setback on account of the conditions created by the war. Before the war, there were 8 workshops. The industry suffered owing to the scarcity of raw materials, viz., iron, teakwood, cedar wood and canvas. In pre-war days, cedar wood used to be obtained from Malabar, teak wood locally or from Bezwada and iron from Madras.

Boat building

354. The boat building industry is carried on as a small scale industry, at Narasapur and Nidadavole in the West Godavari district and at Tallarevu in the East Godavari district. In the East Godavari district, about 400 families of Agnikula Kshatrias are engaged in the industry. In the West Godavari district there are about eight boat builders with 10 or 15 persons working under each. The workers are employed for wages by the contractors and capitalists who want to build boats. The industry is carried on almost throughout the year. The chief materials required are wood and iron. Wood is obtained from the Bhadrachalam forests, but difficulty is experienced in getting iron. About 30 boats valued at Rs. 1,50,000 are manufactured every year. The cost of constructing a boat of 36 tons is estimated at about Rs. 5,000. If the boat is let out on hire, it will fetch an income of Rs. 3 per ton per month, i.e., about Rs. 100 a month. If it is run by the owners themselves, the gross income will be about Rs. 500. Deducting the rowing charges of about Rs. 300 there will be a net income of about Rs. 200 per month. In the boat building industry the skilled labourer gets about Rs. 1-12-0 to Rs. 2 and the unskilled labourer about ten annas to twelve annas per diem. There is demand for boats and the industry can be expected to thrive even under post-war conditions. There is a proposal to form a co-operative society for boat builders at Tallerevu in the East Godavari district.

Wooden comb making

355. The industry of wooden comb making is carried on by a few families of Dommars and Muslims at Kothapet in Kalahasti and at Nerabylu in the Vayalpad taluk of the Chittoor district. About 100 families in these two places are employed in the industry. Musti, Darsana, Tade and Devadari are the common forest woods that are used for the combs and they are available in the surrounding forests. The right of collecting the wood from the forests is obtained by forest contractors who supply the wood to the comb makers. The workers carry on the industry as owners. They are not indebted to any middlemen, as the capital required for the industry is small and the tools and appliances are simple and cheap. The combs made at Kalahasti are superior to those made in the other centres and are very popular among women. They are sold at Kalahasti itself to the merchants of Tirupathi. The annual output of combs in these two centres is estimated at about Rs. 10,000. Each comb costs about 3 pies including wages and cost of wood. The producer sells it at 5 pies to the merchant and

the latter sells it at prices ranging from 8 pies to one anna. A worker engaged in the industry as a wholetime occupation gets an income of 12 annas to one rupee per day on an average. The industry has received an impetus on account of the conditions created by war, when there was no import of combs into the Province. An attempt was made to organize a co-operative society for the workers at Nerabylu, but with no success. Wooden combs are also made in Ramamurtinagar and Mosur in Omalur taluk of the Salem district by a few families of Reddis and Dommars. The combs are of a crude type and used mostly by villagers. They are generally sold within the district.

Fly shuttle looms

356. Fly shuttle looms are made in Conjeevaram and Saidapet in the Chingleput district. The industry is carried on by carpenters in these two centres, as a number of handloom weavers are concentrated there. The workers carry on the industry generally with their own funds and are able to market the looms themselves. They do not experience any difficulty in the matter of finance or marketing. A loom costs about Rs. 60 now. The annual output in these two places is estimated at Rs. 25,000. A worker engaged in the industry earns Rs. 1–8–0 to Rs. 2–8–0 a day. The workers are not solely engaged in making looms but make them side by side with their other carpentry works. Their chief difficulty is in getting timber. This difficulty is likely to disappear soon.

Cane and rattan work

357. Cane is available in the old riverbed of the Pennar adjoining Indukurpet in the Nellore district to an extent of nearly 200 acres, a large portion of which is included in private holdings. It is also grown on the southern banks of the river Coleroon near Anaikaranchattram in the Shiyali taluk of the Tanjore district on a large and narrow strip of land. In certain parts of the Malabar district, growth of wild cane is abundant. It is also available in Pedavalasa (Narasapatnam agency) and near Parlakimidi and Chirala. The cane that is grown in this Province is not quite suitable for fine work. It does not possess the same smoothness, gloss and polish as Malacca cane which used to be imported largely into this Province. The rattan industry received a set back when the import of Malacca cane ceased on account of the war.

Cane or rattan work is carried on in Madras and Rajahmundry as a small scale industry and as a cottage or subsidiary industry in Anaikkaranchattram in the Tanjore district and in Indukurpet in the Nellore district. In Indukurpet, cane baskets and boxes of a crude nature are manufactured by some Mutharachan families. The workmen pay about two annas to the owner of lands on which cane is grown and take one bundle of cane weighing about 1 viss. The thin cane is not split. It is used for making baskets for carrying provisions. Some skilled work is done with cane in Nellore

town, where cane netting is done for chairs, cots and other articles of furniture. Cane is also grown in the islands of Sriharikota and the long stretch of land on the north-eastern side of Pulicat lake where the soil seems to be favourable for its growth. It is exported to Madras in small quantities. Locally, big baskets useful for agricultural purposes are made by " Yanadis " the material used being whole cane. The cane produced here is brittle and its surface is not smooth. It is therefore used only for rough cane work. The Nellore variety is used for making screens also. It has got a demand in Madras, in Tinnevelly and Tanjore. Both in Madras and Rajahmundry the rattan industry is in the hands of capitalists and the actual workers get wages which range from Re. 0–8–0 to Rs. 4 a day. Skilled workers are paid from Rs. 2 to Rs. 4 and ordinary workers are paid from 8 annas to one rupee. About 175 workers are engaged in the industry in both these places. In the Tanjore district, a dozen merchants in Anaikaran-chattram and other adjoining villages take on lease from the Government the country canes grown on the banks of the river Coleroon and supply them to workers. Baskets and camp boxes are made. There are about 20 workers and they earn on an average one rupee a day. As the cane available in the Province is rough and the articles made of this cane have only a limited sale, the industry is not capable of further development, nor can it be organized on a co-operative basis.

Basket-making

Bamboo baskets

358. Baskets, winnows, seives, screens and " thatties " made of bamboos are articles of daily use in household and for agriculture and are in demand everywhere. The industry exists in some form or other in all districts. It is, however, carried on on a large scale in the South Arcot, North Arcot, Chingleput, Bellary, Kurnool, Chittoor, Salem, Trichinopoly, Madura, Malabar and South Kanara districts. It is also carried on on a large scale in Madras. Medars, Koravas, Naickers, Muslims and members of the scheduled castes are engaged in the industry. The industry is localized generally in places where the supply of bamboos is plentiful. The workers are not organized. Each works independently. The workers obtain the raw materials from the reserved forests or from the local bazaar. The right to cut bamboos in reserved forests is generally obtained on lease by merchants and the workers are permitted to gather bamboos on payment. The capital required to purchase the bamboos is small. Except in the districts of North Arcot and Chittoor, workers are generally able to carry on the industry with their own funds. In the North Arcot district, they borrow funds from agents and enter into an agreement with them to supply baskets continually. The prices are generally fixed by the agents at rates lower than the market prices. In the Chittoor district also, workers are indebted to merchants to whom they sell the baskets. Both men and women are employed in the industry ;

while generally the men do the splitting of the bamboos and prepare them for baskets, the women attend to the weaving work. The implements required are only a big knife (aruval) and a hammer.

359. As the demand for baskets is continuous, the industry is carried on throughout the year. In the North Arcot district, a bundle of split bamboos containing 80 to 100 numbers costs Rs. 2-4-0. The pre-war price per bundle was 12 annas. Twenty-four baskets can be made in two days, by a single worker out of a bundle of split bamboos. The market price is Rs. 4-8-0. The worker gets about Rs. 2-4-0 in two days or one rupee and two annas per day. Generally all the members of the family are employed in the industry and the daily income of the family thus depends on the number of members in the family. There are two co-operative societies for basket-makers at Santhapet in the Chittoor district and at Kurnool. There is scope for organizing co-operative societies at Pollachi in the Coimbatore district, at Vellore in the North Arcot district, at Bodinayakkanur in the Madura district and in a few centres in the Salem district. But these societies can work successfully only if there is a paid establishment to arrange for the supply of raw materials to members at cheap prices, to market the finished goods, by outright purchase and to maintain their accounts. As basket-makers are usually poor, financial assistance will be necessary for maintaining the paid establishment till the societies are able to build up adequate reserves. There is also considerable scope for improving the technique of the industry. At present, the workers confine themselves to producing only rough baskets and winnows. They can be trained to produce such articles as chairs, stools, teapoys and tables, out of bamboos. The manufacture of such articles can with advantage be undertaken by the co-operative societies that may be formed for these workers provided they are suitably subsidized.

Other baskets

360. In certain places like Udipi and Mangalore in the South Kanara district, baskets are made out of rods and creepers called "Engeria belu" which are found in the neighbouring jungles. Those baskets are used for storing grain and carrying articles from one place to another. Sivapur, three miles from Hebri, is one of the chief centres of this industry. Karkal is another centre where rod and creeper baskets are made on a large scale by Koragas who go for labour work and revert to basket-making when they find no other employment. Men, women and children all join together in the industry. The rods and creepers are available in unreserves and can be obtained free. While green, they are boiled and split into long pieces of ribs for making baskets. Thick rods are used for the ribs of the baskets and finer strands are filled between them. A bill-hook and a stout knife for cutting and riving the creepers and shaping them are all the instruments used by the Koragas. A Koraga can make two baskets a day, worth 8 annas in the pre-war days. These are sold to merchants who export them to other districts.

In the Tinnevelly and Ramnad districts, fancy boxes in different colours are made of palmyra leaves. The chief centres for this industry are Tenkasi, Udangudi, Kulasekarapatnam and Manapad (Tinnevelly) and Pannaikulam, Alagankulam, Saakottai, Tiru-pallani, Rameswaram and Chittarakottai (Ramnad). Over one thousand Muslim and Nadar women are employed in this industry as a subsidiary occupation. The industry is carried on throughout the year by the workers with their own funds. The raw materials required are, palmyra leaves and dyes. A small knife is the only tool required for the industry. Palmyra leaves and dyes are purchased by the workers, locally. The demand for the goods is continuous. Dealers in palmyra boxes go to the villages, purchase them and sell them to bigger merchants who export them outside the district. These boxes find large sales in Northern India and Ceylon. A worker employed in the industry as a wholetime occupation gets on an average 8 annas a day. The economics of the industry is as follows :—

	RS.	A.	P.
One bundle of palmyra leaves	1	4	0
Dyes	2	0	0
Labour charges for making 20 fancy baskets of 10″ × 8″ × 4″ with cover	3	12	0
	7	0	0

A basket is sold at 7 annas in the production centre to merchants. The consumer's price per basket is 8 to 9 annas. The workers do not suffer from handicaps and are carrying on the industry well.

Mat weaving

361. The common korai mat is one of the few articles found in almost every household. It is used by a large number of people as bed spreads and for various other purposes. It is the only bed which the poorer classes can afford. The making of these mats by hand is an agreeable cottage industry providing full time as well as subsidiary occupation to the rural people. The implements required are not costly and much skill is not required except for making mats of superior variety. Mats of ordinary and coarse varieties are made also by women and children. The industry is pursued in places where korai, the primary raw material, is available in abundance. Korai grass grows spontaneously by the sides of channels, rivers and pools and at the foot of hills. It is also grown on wet lands as a wet crop. It requires as much water as paddy. It is propagated by plantation of roots and each plantation lasts for about 10 years. It is cultivated on a commercial basis in Tanjore, Trichinopoly and North Arcot districts but more extensively in North Arcot. Three types of mats are made of korai. viz., the plain variety of coarse mats with warp of aloe fibre, yarn and weft of korai sedge, a second variety of mats made of split

korai in which the pith has been removed and which contains beautiful stripes and designs in red, violet, green and black, and a third variety of superfine mats made in Pattamadai and Viravanallur in the Tinnevelly district which is used generally for decoration as wall hangings. It is usual in the mat trade to describe the fineness of count of a mat by the number of warp threads contained in a span measuring 9 inches. The greater the number of strands the higher the count. The counts of Pattamadai mats range from 50s to 140s, while the common varieties range from 18s to 24s.

362. The raw materials required for the industry are (1) korai reeds, (2) fibre (usually aloe fibre) for use as warps, (3) dyes, and (4) cotton and silk yarn to be used as warps for costly mats and for sewing the borders of the mats. Aloe fibres, dyes and cotton and silk yarn are locally purchased from shops. Aloe fibre is made also by the workers themselves especially those belonging to the poorer classes. The wild growth of korai on the banks of jungle streams and pools is permitted to be removed free. Where it grows on the banks of rivers and irrigation channels and on lands adjacent to railway tracks, the right to cut the reeds is sold by auction. The lessees usually sublet convenient blocks of the area to the workers for cutting and removing the reeds. In the case of patta lands, the owners either cut the korai themselves and sell it to merchants and workers or lease the lands to them. But owing to their poverty, the workers cannot afford to take the lands on lease. Therefore, in most cases, the lease is held by merchants. In places where korai is allowed to be removed free, the workers themselves collect the reeds. In certain parts of the Tanjore district, members of the scheduled castes gather the reeds and sell them to workers. Except in places where the workers are allowed to remove korai free of cost, they generally depend for the supply of this raw material on merchants and capitalists who have taken the lease of lands. In the North Arcot and Tanjore districts, the korai grown is more than necessary for requirements and the surplus is exported to other districts. This trade is also in the hands of merchants. In districts like Tinnevelly and Trichinopoly, where the local production is not sufficient to meet the demand, merchants dealing in korai purchase it from other districts and supply it to the workers. The districts of Guntur and Cuddapah draw their supplies partly from the Nellore district. The price of korai varies according to quality. The raw korai is sold in bundles and the size of the bundles also varies in different places. While in some places, one bundle of korai will be sufficient for making 22 to 24 mats, in certain other places 70 mats can be made with one bundle. In the absence of a uniform unit for measuring the quantity of raw material and of a standard to judge its quality, it is difficult to compare the prices obtaining at various centres.

363. The wild korai is cut generally in January after the rainy season, when it is green, and split into vertical fibres. The pith

is removed and the fibres are dried. In Pattamadai, where mats of fine quality are produced, the reeds are cut in twos and exposed to the sun for nearly 40 days as a result of which the reeds acquire a golden yellow colour and the pith becomes dry. They are preserved for use during the year. Before weaving, they are soaked in running water for nearly three days with weights placed on them, so that they may not be washed away by the stream. Scrupulous care is taken to see that every part of the reed is properly cleaned to expel the pithy matter therefrom. The two halves of the korai are again split lengthwise into two or three fine filaments. The korai is dyed in synthetic colours. It is first soaked in water for a night, dried in the sun the next day for a while and then soaked in the dye bath. When it has absorbed the requisite colour, it is removed and washed. In Pattamadai, for mats of superior quality, indigenous vegetable dyes are used to give a lasting colour to the fibres. The loom used for weaving is a simple and cheap one. The most common type of loom consists of two stout bamboos placed at a distance equivalent to the length of the mat and kept in position between two pegs driven in the ground.

The industry does not require much capital. The ordinary simple type of loom does not cost more than Rs. 5. The raw materials also do not require large funds. The workers, therefore, generally carry on the industry with their own capital. They, however, sometimes obtain advances from merchants for family expenses and repay the advances when the mats are sold.

The marketing of mats is mostly in the hands of merchants and in rare cases only the workers themselves attend to it. Where the production is on a small scale, the workers themselves sell the mats in shandies or hawk them in the neighbouring villages and towns. In other places, they sell a part of their output to local consumers at local shandies. But the bulk of their production is sold to merchants. There is demand for mats all through the year, but the demand during summer and marriage seasons is heavy. As Japanese mats are not now imported into India, there is a growing demand for these mats. The mats can be sold soon after production and there is no risk of the stock remaining unsold for any length of time. In large centres of production like North Arcot, Malabar and Trichinopoly, the mats are exported outside the districts. The mats produced at Wandiwash in the North Arcot district are exported to Bombay and Bangalore.

364. It is calculated that the preparation of warp and weft for a single korai mat of the coarse variety takes a day and that two mats of six feet each can be woven in a day of ten hours. But for the Pattamadai mats of superior quality, the preparation of warps and weft for a single mat of 140s would engage a man for 25 days, whilst the time taken to weave it is 40 days. There is considerable waste during weaving, as the korai often breaks in imparting a slight twist to round the fibre. The cost of raw materials for a coarse mat does not exceed 8 to 12 annas. In

Trichinopoly and Tanjore districts, the cost of producing a mat, 3½ feet by 5½ feet, is—

	RS.	A.	P.
Korai grass	0	6	0
Fibre	0	1	0
Dye	0	1	0
Total ..	0	8	0

365. There are five co-operative societies for mat weavers, three in the Tinnevelly district and one each in the districts of Tanjore and South Arcot. The industry requires marketing facilities more than technical assistance. An organization which can undertake orderly marketing with a view to securing fair prices to the producers will greatly facilitate the development of the industry. One other difficulty of the mat weavers is in securing the essential raw material, korai, at reasonable prices. In both these respects. co-operative societies can help the mat weavers. But the societies formed for mat weavers require help from the Government. The societies should be allowed to gather free of cost the korai grown on Government lands and river-beds. Where, however, the growth is abundant and the Government have been getting an income by leasing the lands to merchants, the lands should be leased to co-operative societies without auction and an average rental should be charged. If Government lands on which korai can be grown is otherwise lying waste, co-operative societies should be permitted to grow korai on such lands for the use of their members. As these societies will consist mostly of poor illiterate members, they can neither manage the societies themselves nor afford to pay from their resources for any paid establishment. Government might, therefore, in the initial stages, grant subsidies to these societies to meet the cost of the paid establishment. There are promising possibilities of organizing co-operative societies in the districts of Tanjore, Trichinopoly, Malabar, Salem, Chingleput and Nellore. Another line of development is in making various articles out of the mats, like table centres, cushions, handbags and the like. An extensive overseas market can be developed for these articles. Initiative for such work should be taken by the co-operative societies.

Besides korai mats, other kinds of mats are also made with palmyra, date and screwpine leaves. These are not woven on looms but simply plaited by hand in many districts. Palmyra mats are produced largely in Guntur, Nellore, the Circars, Tinnevelly and Ramnad districts. Date mats are manufactured in certain areas in the Nellore, Chittoor, Salem, South Kanara and South Arcot districts. The making of palmyra mats is a subsidiary occupation. The date mat weaving industry provides unfailing work throughout the year, as these mats are used for packing tobacco, jaggery, furniture and for spreading on the floor. Screwpine mats are made in the districts of Malabar, South Kanara, Chingleput and Tanjore.

These mats also are used for packing tobacco. All these varieties of mats are fairly cheap and neither the procurement of raw materials nor the marketing of the mats presents any difficulty.

Leaf Platters

366. The making of leaf platters is a useful subsidiary occupation which gives continuous employment all through the year, as leaf platters are widely used by all castes. It is one of the home industries in which women can profitably engage themselves. It does not require special skill, nor does it involve much physical labour. The industry is carried on in most villages by women of all castes for their own family consumption. It is pursued on a large scale at Veeraghattam, Srungavarupukota, Parvatipur, Salur, Kottakota and Gazapathinagaram of the Vizagapatam district, in many of the villages of Nellore, Kovvur, Kandukur, Kavali, Atmakur and Rapur taluks of the Nellore district, in Chengam and Tiruvannamalai taluks of the North Arcot district and in many villages in the Cuddapah districts. The production of the Vizagapatam district is larger than that in other centres, as the raw material required, namely, leaves and broom sticks, are available in plenty in the reserved and unreserved forests in the district. The leaf platters of this district are exported to many other districts in the Province including Madras City. The leaves commonly used for leaf platters are adda, maduga, tada, banyan, cashewnut and murukkan. As the industry requires very little capital, the workers carry on the industry with their own resources. In the Vizagapatam district, the workers purchase the leaves from hill men who bring them down in head-loads or in "kavadis." For preparing about 100 leaf platters, leaves worth about 4 annas and broom sticks worth about one anna will be required. A woman can prepare about 100 leaf platters a day. The consumer pays about 12 annas for 100 leaf platters. The margin of profit is 7 annas of which 3 annas go to the actual worker and the balance to the middlemen. The workers sell the leaf platters at shandies or in their shops if they have one. But most of the stock is purchased by middlemen in the trade.

Stone work

Stone carving

367. The stone work industry is a very old one. The articles produced are of two kinds, viz., skilled and unskilled. To the former class belong all stone idols, images and the carved stone pillars, which are to be found in Hindu temples. Grinding stones, stone mortars and other stone articles for domestic or other uses are of the latter class. The making of images is an art. Stone images are made in Modaiyur village, Polur taluk and in Agaram of Tiruvannamalai taluk of the North Arcot district, Thirumurugan-poondi in the Coimbatore district and in Thanthoni in Karur taluk and Woriyur in Trichinopoly taluk of the Trichinopoly district. The raw material required is stone and the tools employed are chisels and hammers, costing Rs. 3 to Rs. 10. The images made

are of several Hindu deities. In Thirumuruganpoondi the images are produced only against orders. There is demand for the images produced in other centres. The cost of an image varies according to size, skill and labour involved. In the North Arcot district the value of the annual output is about Rs. 200. It is about Rs. 4,000 in the Trichinopoly district. There are two co-operative societies for stone workers, one at Modaiyur and the other at Thanthoni. The members of the Thanthoni society produce stone articles such as grinders, mortars and "ammis". The products of this industry, except stone articles for domestic use, have only a limited appeal and there is little scope for the large scale development of the industry.

Soap-stone ware

368. Soap-stone is a variety of steatite. Household utensils, idols, toys and other small articles such as ink bottles, chess pieces and snuff boxes are made of this stone. The industry is pursued in Semmandapatti, Periyasoragai, Chinnasoragai, Mecheri and Guttapatti in the Omalur taluk and Iswaramoorthypalayam in Attur taluk of the Salem district, in Karavi and Kutluru in Karkal taluk of the South Kanara district, in Saidapuram village in Rapur taluk of the Nellore district and in Koppukonda in Vinukonda taluk and Durgi in Palnad taluk of the Guntur district. The vessels made of this stone, which are also called pot stone vessels, are largely used in Hindu households for culinary purposes as they are acid proof. The raw material is available within easy reach of the workers and is quarried from patta or poramboke lands. The tools required are crowbars, chisels and hammers and they cost about Rs. 15. Much skill is not required in shaping the vessels and polishing them. The capital required for the industry being very small, the workers are able to carry on the industry generally with their own funds. The worker gets an income of twelve annas to one rupee per day. The value of the annual output in the Salem district is about Rs. 10,000 and in the South Kanara district about Rs. 2,000. In South Kanara the articles are sold in shandies. In Salem, besides local sales, goods are exported to Palghat, Kumbakonam, Rajahmundry, Bangalore, Nellore and Madura, though on a limited scale now, owing to want of transport facilities. There is constant demand for the articles as they are acid proof and are not as brittle as earthenware or as costly as metal-ware. There are possibilities of organizing a co-operative society for the workers in Salem district, as they are larger in number and able to market the goods outside the district. The society can arrange to market the goods for very fair prices.

Slate making

369. Slate making is a thriving industry in Markapur and Cumbum taluks of the Kurnool district. It is carried on by individual firms on a small factory scale employing less than 20 men. There are some factories using power for the manufacture of school slates

and slate pencils. A slate manufacturing factory has been started at Kallai in the Malabar district and is manufacturing, on a small scale, good quality slates out of slabs imported from Markapur, the proprietors of the factory having acquired a plot of land at Markapur on mining lease. The industry is carried on in three different stages, viz., (1) quarrying of slate slabs, (2) preparing slate slabs and (3) polishing of slate slabs and fixing up the frames. Some cottage workers prepare slate slabs and sell them to merchants who sometimes fix the frames and sell them as school slates or sell the slate slabs to factories manufacturing school slates. In Markapur town alone there are 2,000 workers including men, women and even children engaged in the industry. It is estimated that in Cumbum and Markapur taluks roughly five to six thousand workmen find employment in the industry. In most cases the workers are employed in the small factory establishments owned by merchants. Only three factories at Markapur use mechanical power. The school slates exported from the two taluks of Markapur and Cumbum during the last three years are as follows :—

Year.			Cases of 4 dozen each.	Value.
				RS.
1942	..	..	84,970	10,19,640
1943	..	..	94,715	12,31,295
1944	..	..	93,935	13,15,090

370. The war has given an impetus to the industry. Owing to the absence of imports of foreign school slates there is steady progress in exports to other places in the Province. Slate slabs are quarried from slate mines which are about 8 miles from the towns of Markapur and Cumbum. The other raw materials required are wood and nails for framing slates and polishing materials such as myrabolam oil. The wood is obtained from Malabar. The nails are purchased from Madras and polishing material is obtained locally. The tools and appliances used by a cottage worker are (1) chisel, (2) saw and (3) emery paper. They are purchased from local shops and cost about Rs. 10. The cottage workers carry on the industry generally with borrowed capital and bind themselves to deliver the finished goods to their creditors who are themselves merchants. Several workers are also employed by firms and factories for wages. Marketing of slates is carried on mostly by merchants who are unorganized. There is very keen competition among them, which threatens to ruin the industry. The economics of the industry is given below :—

(i) Quarrying raw slabs—

	RS.	
Royalty to the mine owner	3	per cart-load of 20 cases.
Quarrying labour ..	6	,, ,,
Cartage	8	,, ,,
	17	

(ii) Splitting, shaping and polishing slabs—

	RS.	
Price of raw slabs	17	per 80 doz.
Sale price of rough polished slates by Karkhanas or individual..	60	,,

(iii) Finishing and framing of slates—
Estimated cost of 4 dozen slates :—

	RS.	A.	P.
Cost of rough slates	3	0	0
Final polishing	0	12	0
Raw wooden frames	4	2	0
Framing	3	8	0
Bundling and packing	0	12	0
Total ..	12	2	0

The merchants usually sell the finished slates free on rail Markapur or Cumbum railway station. The consumer's price per case of 4 dozen slates is Rs. 24. For dressing and finishing one cart-load of slabs (for 80 dozen slates) a worker is paid Rs. 30 or Rs. 35. On an average a worker earns about Rs. 2 to Rs. 3 a day.

371. The industry is not well organized. On account of the keen competition among manufactures cheap slates of inferior quality are produced and dumped on the market. The slabs lack finish and quality and cannot therefore stand the competition of imported foreign varieties in the post-war period. As the demand for slates is great, there is vast scope for the development of the industry. Co-operative societies cannot be organized for slate dealers who are only middlemen living upon the toil of slate diggers and grinders. They can be organized only from among the actual workers. A co-operative society started at Markapur in 1924 went into liquidation in 1930 owing to the competition of merchants and mismanagement of its affairs by the office bearers. The remedy lies in the direction of State effort. A model Government slate factory established at Markapur or Cumbum can improve the finish and quality of slates. It can also improve the economic and social condition of the workers. When once a high standard of production is set up and the products are rendered fit to hold their own against foreign competition, capitalists or even a co-operative organization of workers may take over the slate factory.

Slate pencils

372. Slate pencils-making is closely linked with the slate making industry not only because slate pencils are essential for writing on slates, but also because the raw material for both is the slate slab. The slate mines in the Kurnool district contain good stones suitable for slate pencils also. About 500 persons mostly drawn from the Scheduled Castes are engaged in this industry. The

industry is a very simple one and is carried on generally in the homes of the workers. Even women and children are able to make pencils. But at Markapur a few capitalists are carrying on this industry employing hired labour. Most of the workers engaged in the industry take advances from dealers in slate pencils and bind themselves to sell the finished products to them. The exports of slate pencils in the recent past were as follows :—

Year.		Quantity.		Value.
				RS.
1943	..	6,844	cases of 5,000 pencils each.	76,128
1944	..	5,256		63,072

373. The process of manufacture is simple. The thick slate slabs are first split into thinner slabs of 1/6 inch thickness which are in turn cut into small linear stripes. Slate pencils are made out of these stripes by rounding off the sides by means of a handy instrument. The workers generally purchase cart-loads of slate stones from the slate mines.

The economics of the industry is as follows :—

	RS.
Cost of one cart load of slate slabs	15
Cartage	7
	22
Sale price of 3 cases of slate pencils	36
Labour charges	14

The merchants who buy these pencils paste coloured paper round a portion of them, pack them in boxes and market them. The cost of preparing the pencils for the market is roughly as follows:—

	RS.	A.	P.
Cost per case of 5,000 pencils paid to labourers who make pencils	12	0	0
Cost of coloured paper	1	4	0
Pasting charges	0	12	0
Cost of packing boxes	8	0	0
Total ..	22	0	0
Selling price of 1 case f.o.r. Markapur ..	30	0	0
Net profit	8	0	0

Nine persons can make one case of 5,000 pencils in a dry and can earn Rs. 14. The daily income of a worker is Rs. 1–9–0. The production and marketing of slate pencils is chiefly in the hands of merchants and capitalists. Even the few who carry on the industry with their own funds have no organization by which to contact markets and secure reasonable prices. Apart from the problem of marketing, there is also the problem of procurement of the raw material at cheap prices and this problem can be solved only by bulk purchases. Manufacture of slate and slate pencils should be combined in the slate factory suggested for slate-making.

Glass

374. The glass bangle industry was once a flourishing industry in the districts of Anantapur, Kurnool, Bellary, Kistna, Vizagapatam, Chittoor and Nellore. While at one time in Gutturu (formerly called Gazula Gutturu) in the Anantapur district alone there were 700 men employed in the industry, only one house is actually engaged in it now. But in the districts of Vizagapatam and Chittoor the industry still manages to hold its own. In Vizagapatam about 40 families of Gazula Balijas at Paidipala and ten families at Gompa are employed in the industry and the annual output of bangles is estimated to exceed about Rs. 10,000. Kalahasti, Papanaidupet, Madailedu and Pillameedu are the centres in the Chittoor district where a few families of Balijas and Muslims are engaged in the industry. In both the districts many workers toil for middlemen. The industry is carried on throughout the year. The bangles produced are of the plain variety, but there is a demand and a profitable market for them, especially during the marriage and festival seasons. In Vizagapatam, the bangles are sold within the district itself in shandies and by hawkers. But the Chittoor bangles find large sales outside the district. The raw materials required are block glass, dyes and fuel. The tools required are a pointed rod of iron about one-eighth of an inch thick and a wooden cone over which small grooves of varying sizes are cut, fitted to the end of a rod. Vizagapatam draws its supply of block glass from Kalahasti and other Provinces while Chittoor gets its supply locally. The dyes are purchased from the local shops. In Vizagapatam, some of the workers obtain the supply of block glass from merchants on credit and supply them glass bangles. The block glass prepared locally is powdered, mixed with broken pieces of old bangles and melted in earthenware crucibles in small furnaces, while imported glass of good quality is melted pure. A small quantity of this molten glass is taken on the point of the iron rod and turned round and round until it becomes a rough ring. This ring is then transferred, while still hot, to the wooden cone and twirled round. The bangles are also shaped with brass moulds. To get various colours, dyes are mixed with the powdered block glass before melting. A bangle maker with the assistance of a boy can produce as many as 200 dozen bangles in one day. But this is the maximum which an experienced man can turn out. It can safely be estimated that an average worker will be able to turn out about 1,000 bangles a day on an average. The economics of the industry is as follows :—

	RS.	A.	P.
One maund of block glass	10	0	0
Fuel and colouring materials	10	0	0
Labour charges for the boy for 2 days ..	1	8	0
	21	8	0

One maund of block glass will yield up to 3,000 bangles. But making allowances for breakages and wastage, one maund of block glass can be estimated to yield about 2,000 bangles. These 2,000 bangles can be sold at prices ranging from 3 annas to 6 annas per dozen according to the quality of the material used, and appearance. Two thousand bangles will fetch about Rs. 31–4–0, at 3 annas per dozen. From one maund of block glass the worker is able to earn about Rs. 9–12–0. Assuming that the preliminary processes will engage the worker for a day, Rs. 9–12–0 are his earnings for 3 days. But owing to the absence of a steady demand and want of adequate supply of block glass and fuel, the worker will ordinarily be employed in the work only for about 15 to 20 days in a month and his average income will work out to Rs. 49 to Rs. 65.

375. Owing to the import of fancy bangles, the demand for the local bangles of crude type is not steady. The industry continues to hold its own because of the religious significance attached to the bangles and because the poorer classes still buy the cheaper qualities. The locally made bangles are mostly of the plain variety and no new and attractive designs have been introduced. The worker is unable to get adequate supply of block glass and fuel so as to engage him throughout the month. Block glass prepared locally is usually of an inferior quality. The workers must be taught how to purify the crude soda earth and to adopt simple modern methods to enable them to produce clear glass. The methods of melting block glass in ordinary country furnaces are costly. Cheap and efficient furnaces which would generate high temperature should be evolved.

Large quantities of bangles are imported into this Province. There are several glass factories in the United Provinces, Central Provinces, Bengal, the Punjab and Bombay and there are two factories in the Hyderabad State, but in Madras there is only one factory, viz., the Jamal Glass Works, Madras. The chief raw materials for glass are sand, lime and soda ash. Though soda ash has to be imported from abroad, this Province has plenty of the other materials. The ceramic survey of the Province (1930–33) shows that alkaline earth known as " Tsodu Mannu " is available in plenty in the Anantapur and Kurnool districts and in smaller quantities practically all over the Province. There would appear to be great possibilities of establishing more glass factories in our Province which can supply glass to glass bangle makers.

376. The question of the revival of the bangle industry in the Province has engaged the attention of the Government and the Industries Department from time to time but no positive steps appear to have been taken in this direction. The Famine Code Revision Committee of 1938 observed as follows : " The glass bangle industry once flourished in many villages of the Ceded Districts. It would probably do so again if block glass could be supplied at a sufficiently low price. The possibility of reviving the industry through a glass block supply from the Jamal Glass Factory, Madras,

or some other factory may be considered and demonstrations of improved methods of manufacture of glass bangles as a cottage industry may be arranged. It might also be possible to establish a glass factory in Anantapur district, making use of silica from the Pennar River." Glass bangles of attractive types are becoming increasingly popular with Indian women of all classes, rich and poor alike. In the Pycrofts Road, Triplicane, Madras, within a distance of about 100 yards, about half-a-dozen shops can be seen, almost all of them crowded by women of all classes. Broken pieces of glass, which are now put to no use but thrown away seem quite suitable as raw material for bangle making and in certain places they have been successfully utilized as the sole raw material for the industry. With improvements in the design and methods of manufacture there appear to be great possibilities for the glass bangle industry on a cottage basis in the Province. Co-operative societies can then play a part in procuring raw materials and in financing and marketing the products of this cottage industry.

377. The bangle makers of this Province do not know the methods of making ration, imitation, fancy and china fancy or coral fancies which are popular in the market and which are being imported now from Ferozabad. In the pre-war days, these were being imported from abroad. With a view to introducing improved methods of manufacturing glass bangles and glass beads a scheme for training students in this industry has been approved by Government. The scheme provides for training twelve students, nine in the glass bangle industry and three in the glass bead industry for a period of one year and for the payment of a stipend of Rs. 25 per mensem to each student for eleven months in the year. A Glass Technologist has been appointed on contract for a period of two years whose main duties will be to conduct a survey of the Province for raw materials required for the glass industry, to offer technical assistance to private industrialists in the line and to formulate proposals for the establishment of a model glass factory if private enterprise is not forthcoming to set up such a factory on up-to-date lines. The Glass Technologist has conducted a rapid survey of the raw materials and has drawn up a scheme for setting up a Government Glass Factory. The proposal is under the consideration of the Government.

Ceramic industry

378. The ceramic or pottery industry is one of the oldest and most important village industries. It meets the local demand for household utensils at cheap prices. In the olden days, a potter was a village artisan who was remunerated by a share in the produce. Even to-day this system prevails in many villages. The profession is generally carried on by a community called Kummaras or Kusavans. By the extended use of metalwares some inroads

have been made in the sphere of pottery, but still the poorer classes use the ordinary earthen vessels on account of their cheapness. The industry is very widespread and the potter can be seen in any part of the Province. The simple wheel which costs about Rs. 5 is the only tool that the ordinary village potter requires. It is placed horizontally on the ground and rotated round an axis by means of a stick. The vessel is moulded by the potter with both hands while it is rotated by the wheel. After the pots are halfdried, they are beaten to set right unevenness and made ready for the kiln. The ordinary potters' kiln is a simple one. Fuel and rubbish are mixed together and laid on the ground and over them are placed a layer of pots, then another layer of fuel and so on. Pots are baked also in a pit about four feet deep covered at the top with earth and pot streds leaving a hole in the middle through which the kiln is lighted. In Karigiri in the North Arcot district, the articles are baked over an earthen circular. The principal material used for ordinary earthenware are the red clay and the black clay available from the beds of tanks, pools and banks of streams. Fine pottery clay is used in the West Coast districts, in Manamadura in the Ramnad district and in Karigiri in the North Arcot district. In Karigiri white clay is used for superior kinds of pottery. The cost of materials used varies in different places. The price of fuel required for baking also varies from place to place. Mostly cheap fuel, such as rubbish and straw is gathered, and in places where the potter cannot get it free, he has to pay a small price for it. In Vellore the Pot-makers' Co-operative Society has taken on lease the right of removing straw and cow-dung from the Municipal market and cart stands for a rental of Rs. 585. The members of the society purchase these sweepings at the rate of Rs. 2-4-0 for a cart-load of dung and Re. 1 for 3 baskets of straw. The ordinary country pottery which consists of the common utensils of every day domestic use needs no description. But in Uppinangadi in Puthur taluk and Kekraji in Kasaragod taluk of the South Kanara district superior kinds of pottery with glazed surface such as vases, goglets, jars, jugs, pots, teapots and cups and saucers are made. Glazed pottery is manufactured also in Karigiri in the North Arcot district. The potters of this place use white clay and produce artistic articles of both eastern and western style. Karigiri pottery was exhibited at the Wembly Exhibition held in London and at various other continental exhibitions. After the formation of a co-operative society for the potters of Vellore towards the end of 1942, glazed articles of artistic designs are produced at Vellore also on a large scale.

379. The pottery industry requires very little capital and the workers are therefore able to carry on the industry with their own funds. Ordinary pottery is too fragile for transport and is therefore sold locally. Only artistic glazed pottery is sent to outside markets. The potter usually spreads out his ware in shandies or a member of his family vends the wares by carrying them on his head round the streets. There is, therefore, keen competition among the potters

and in their anxiety to dispose of their wares, they frequently sell the goods for low prices. Besides arranging procurement of raw material and introducing improved pottery designs, co-operative societies arrange to market their members' goods at reasonable prices. It is in marketing particularly that the potters' co-operative societies have made progress. The economics of the industry and the average income of a potter per day vary from place to place. They are dependent on the price of raw materials and the type of goods produced. The economics of the industry as carried on in the North Arcot district in respect of ordinary pots is as follows :—

	RS.
Cost of two cart loads of clay	5
Labour charges for three men for manufacture of the articles for five days	15
Baking charges	10
	30
Price paid by the consumers	60
Margin of profit	30

Thus three men will earn (Rs. 15 plus Rs. 30) or Rs. 45 in 5 days. Each workman will earn about Rs. 15 in 5 days or Rs. 3 in a day. But the potter may not be working all through the month. He may suspend his work for a few days each month on account of festivals, fairs, ill-health, and other causes. The average daily income of a potter may therefore be estimated at about Rs. 2.

380. Apart from ordinary pottery, there is considerable room for expansion in ornamental pottery by improvements in designs and methods of glazing and baking. The report on the Ceramic Survey of the Province has revealed that the Province is rich in raw materials that are largely used in the manufacture of porcelain and other glazed pottery. Clay similar to kaolin or China Clay is available in the Vizagapatam, Guntur, Nellore, Chingleput, South Arcot, Tanjore, South Kanara, Malabar, Cuddapah, Bellary, Anantapur and Kurnool districts. Felspar and rocks rich in felspar are found in the Kurnool, Bellary, Nellore, Chingleput, South Arcot, Salem, Trichinopoly, Madura, South Kanara and Coimbatore districts. Clay which can be classified as piple clay can be had in East and West Godavari, Kistna, Chingleput, South Arcot and North Arcot. Gypsum out of which is prepared " Plaster of Paris " is available in the Trichinopoly district. South Arcot district particularly, is one of the richest districts in the Province for ceramic raw materials. A commencement has been made in the direction of improving the industry by introducing a course of instruction in ceramics in the School of Arts and Crafts and by the appointment of a Ceramic Expert. In the ceramic section of the school, six stipends of annas four each per working day have been sanctioned to poor and deserving students in the class. The immediate aim should be to carry

the work of the village potter at least up to the production of pottery with simple glazes and the use of improved kilns.

381. The Special Officer appointed for the development of cottage indutries in the Ceded Districts has chosen the pottery industry in the first instance for intensive development. Pottery training centres have been opened at Cuddapah, at Harpanahalli in the Bellary district, at Betamcherla in the Kurnool district and at Rajahmundry in the East Godavari district. The scheme provides for the training of six professional potters at a time in each of the centres for a period of 4 to 6 months in improved methods of manufacturing earthenware. A stipend of Rs. 25 per mensem is being paid to each trainee. The Centres in the Kurnool and the East Godavari districts provide for the training of the potters in stoneware and fine earthenware and for the marketing of the wares produced by the trained potters. Experiments are being conducted in the School of Arts and Crafts, Madras, on improved firing methods with the aid of an open up draught kiln of the Kurja type. Round or rectangular down draught kilns are considered to be better than Kurja kilns and such improved kilns are also being investigated. Samples of the local clays and other raw materials used by the village potters are tested at the School of Arts and Crafts as regards their suitability for ceramic ware and the results of such tests are made known to the potter community for adoption. Demonstrations are being conducted in selected centres in North Arcot district to introduce among the potters improved methods of manufacturing clay moulds, engobed wares, and glazed wares.

382. The course of instruction in ceramics in the School of Arts and Crafts, Madras, was reorganized in 1944. The establishment of a model Government Ceramic Factory at Gudur in the Nellore district has been sanctioned. The ceramic factory will manufacture tablewares like cups and saucers, plates, jugs, bowls, and tea pots, electric goods like insulators for high and low voltages, special and high frequency insulators for wireless and radio, and sanitary goods like wash basins, and water closets. A laboratory on a large scale will be an adjunct to the Government Ceramic Factory to carry on research in ceramics. A demonstrator has been employed in each of the Bellary and Vizagapatam districts for conducting a survey of the resources of the raw materials for the tile industry in the districts. The employment of a Technical Assistant (Tile Manufacture) for developing the tile industry in the East Coast of the Province has also been recently sanctioned. The Technical Assistant will assist private industrialists in establishing new tile factories and in effecting improvements to the factories already established. A proposal to open an experimental centre in one of the tile factories in the South Kanara district for conducting research work on the ceramic raw materials available in the district is under the consideration of the Government.

Crucibles

383. For smelting metals, crucibles which will stand high temperature are required. These crucibles are mostly imported from outside. In this Province the East Godavari district seems to be the only place where these crucibles are made. Though they stand the furnace just as well as the foreign variety, they are often crude and need a good deal of improvement. They cannot be used for smelting metals as many times as the foreign crucibles can be used. There are possibilities of developing the industry, as all the raw materials required are within reach in this Province. The industry is pursued by workers belonging to the Kummari caste. It is carried on at Rajahmundry, Dowlaishweram, Angara Gollalamanidada, Cocanada and Tapeswaram. In Rajahmundry about 600 families with about 150 skilled workers and at other centres about 10 workers with one skilled worker are engaged in the industry including men, women and children. There are about 20 regular crucible workshops at Rajahmundry. All these are managed by master workers who are capitalists well established in the business. There are also a number of middlemen who purchase the crucibles from the workshops and sell them to metal workers. The actual workers are mere wage-earners who work for 8 hours a day, the wages being Re. 1 for a skilled worker and ten annas for an ordinary worker. The annual output of crucibles is estimated at Rs. 5 lakhs. The raw materials required for the industry are graphite, china clay and borax crystals. Graphite is obtained from Jangareddigudem which is about 50 miles from Rajahmundry in the West Godavari district. There are several mines at Jangareddigudem and other places in the neighbourhood. A ton of graphite of first quality costs Rs. 600 and second quality Rs. 400. The second quality of graphite is not suitable for superior varieties of crucibles. The cartage for one ton of graphite from Jangareddigudem to Rajahmundry is about Rs. 40. China clay is obtained from Mommuru about 6 miles from Rajahmundry. One bag of clay weighing one cwt., costs Rs. 2–4–0 including cartage. Borax crystals are purchased in the local shops and they cost Rs. 40 per cwt. The tools and appliances required are (1) moulds made of brass and wood, (2) mortars of stone and (3) sieves of brass wire. Moulds are manufactured locally by the Viswa Brahmans and the cost varies with the size. Stone mortars are purchased from Kateru, a village about 3 miles from Rajahmundry and each costs about Rs. 2. Sieves are available in the local shops and the price of a sieve is about Rs. 3–8–0. The economics of the industry is as follows :—

	RS.	A.	P.
1. Raw materials—			
Graphite, 1 ton	640	0	0
China clay. 1/3 ton	16	0	0
Borax crystals, ½ cwt.	10	0	0
Coating materials	16	0	0
Fuel	22	0	0
	704	0	0

	RS.	A.	P.
2. Labour charges as per details given below*	159	10	0
3. Interest on capital	5	0	0
4. Rent	5	0	0
Total ..	873	10	0

* First day—20 workers for pounding graphite at annas 10 per head	12	8	0
5 workers for pounding the clay at annas 10 per head	3	2	0
Second day—4 workers to mix the dry graphite and clay at annas 10 per head ..	2	8	0
Third day—10 workers for wet pounding with legs at annas 10 each	6	4	0
Fourth day—10 workers for wet pounding with legs at annas 10 each	6	4	0
Fifth day to 7th day—10 workers per day for wet pounding in mortars at annas 10 each.	18	12	0
8th day—10 workers at annas 10 per day for removing small stones, from the pounded mixture	6	4	0
9th day—No work (Males are employed from here. Females do generally the above work)		..	
10th day—4 workers for making small lumps at Re. 1 per head	4	0	0
11th day do.	4	0	0
12th day to 16th day do. ..	20	0	0
17th and 18th days—4 workers per day for giving finishing touch to the moulds ..	8	0	0
19th to 25th days—Utilised for drying ..		..	
26th day—4 workers for coating on Re. 1 each	4	0	0
27th and 28th days—Burning of the raw crucibles		..	
29th day—4 workers to remove the burnt crucibles	4	0	0
Establishment charges	35	0	0
Sundry expenses	25	0	0
Total ..	**159**	**10**	**0**

With the above raw materials, crucibles of different sizes up to about 5,000 units can be produced. Allowing a margin for

breakages, the net production may be estimated at 3,500 units. The production cost per unit works out to Re. 0–3–6 to Re. 0–4–0. The price at which the crucibles are sold to the middlemen ranges from Re. 0–5–0 to Re. 0–5–6 per unit. The retail rate is about 6 annas to 7 annas per unit. The retail price is nearly twice the production cost and if the industry is organized on a co-operative basis this margin could be secured for the actual workers themselves.

384. The crucibles are sold locally and sent out to the Punjab, Kalahasti and other industrial places all over India where melting of any metal is necessary. There is great demand for these goods. A crucible of good quality lasts for melting cast iron 6 to 8 times and brass about 15 times. The industry has received an impetus on account of the War when there was no import of foreign crucibles into the Province. Though the industry is well established, there is considerable scope for improving the quality of the crucibles to a higher standard. Apart from improving the industry there is also the need for the betterment of the conditions of the actual workers in the industry who are at present mere wage earners. A co-operative society formed for these workers will have to face strong opposition from master workers and middlemen and Government assistance will be necessary in the matter of securing raw materials at concessional rates, finance and technical advice.

Tobacco

Cigar manufacture

385. The manufacture of cigars is carried on on a large scale in Dindigul, Madura and Woriyur (Trichinopoly). About 3,500 persons in Dindigul, 500 in Madura and 2,000 in Woriyur are engaged in the industry. The workers are employed for wages in small cigar factories owned by capitalists. There are about 50 such factories in Woriyur, 25 in Dindigul and 6 in Madura. The industry provides employment to the workers all through the year and the average income of a worker is Rs. 1–8–0 to Rs. 2 per diem at present, while it was 10 to 12 annas in the pre-war days. The wages are based on the quantity of work turned out. For making 1,000 cigars, Rs. 5 as wages and Rs. 5 as war allowance are paid in Trichinopoly. Though the cigaratte habit has affected the industry a little, there is and will always be great demand for cigars. In Woriyur the industry is entirely in the hands of capitalists. Co-operative Societies for cigar manufacture have been organized in Dindigul and Madura. The industry in Trichinopoly obtains tobacco leaf from Karur and Dindigul and in Madura and Dindigul it draws its supply of tobacco leaf from the areas around Dindigul and Bhavani in the Coimbatore district and Kumarapalayam in the Salem district. The cigars find a wide sale in several parts of the Province and are also exported to Bombay and other places in India. In the pre-war days Woriyur cigars were

exported to the United Kingdom and other foreign countries. The economics of the industry is as follows :—

Madura and Dindigul

Cost of producing 1,000 good quality cigars.

	RS.	A.	P.
Tobacco, 1½ visses, Rasi	4	14	0
Tobacco, ½ viss, Kurusu	1	0	0
Wages	2	0	0
Wrapper	0	8	0
Gum	0	2	0
Dryage	0	8	0
Excise duty	2	8	0
Total ..	11	8	0
Selling price	12	4	0
Profit	0	12	0 per 1,000 cigars.
High class cigars (1,000)	..		
(1) Superior planters —			
Cost of 16 lb. of tobacco	20	0	0
Duty	3	0	0
Packing	10	0	0
Wages	5	0	0
Stamp duty	10	0	0
Wastage	2	0	0
Total ..	50	0	0
Selling price	60	0	0
Margin of profit	10	0	0 per 1,000 cigars.
(2) Planters—			
Cost of 9 lb. of tobacco	11	4	0
Duty	1	11	0
Wastage	1	1	0
Packing charges	4	0	0
Stamp duty	5	0	0
Wages	2	8	0
Total ..	25	8	0
Sale price	30	0	0
Margin of profit	4	8	0 per 1,000 cigars.

Woriyur (Trichinopoly)

To produce a standard variety of cigar, the following cost is incurred :—

	RS.
For 1,000 cigars, tobacco required	50
Wages	10
Packing materials and wages for packing ..	35
Total ..	95

Excise duty which will vary according to the rate and class of cigar will also be levied on the production. The total cost including the excise duty may come to Rs. 140 for 1,000 cigars of standard quality. The manufacturer gets only 15 per cent on the standard quality and 20 to 25 per cent on the high class cigars.

386. Co-operative societies for cigar manufacture are of recent growth. Two societies, one at Dindigul and the other at Madura were registered during the year 1943–44. Towards the close of 1944–45 another society was started in the East Godavari district for the manufacture of lanka cigars.

387. There are certain difficulties encountered in the cigar industry. At present there is no suitable cigar wrapper tobacco grown in India. The wrapper leaves now supplied by Rangapur planters are very inferior in quality and yielding capacity. The use of this inferior tobacco results in deterioration of the quality of the cigars and adversely affects their sale. The Agricultural Department are now examining the possibilities of growing suitable superior wrapper tobacco in this Province. Secondly, the levy of an import duty of Rs. 7–8–0 per lb. on imported cigar wrapper tobacco prevents the manufacturer from using wrappers of better quality and marketing quality cigars. The quantity of imported wrappers used in the manufacture of cigars is very negligible as it forms only 1/20 part of the fillers. It would be desirable to abolish the import duty on wrapper tobaccos until such time as the domestic tobacco planters can produce wrapper tobacco suitable for this purpose. Thirdly, tobacco and tobacco products are subject to attack by beetles, and every year many lakhs of rupees worth of tobacco are destroyed by these insects causing heavy loss to the manufacturer and tobacco traders. Cured tobacco is stocked by merchants in godowns under the supervision of the Excise Department. Very rarely is it stored for a long time, the stuff being utilized within 5 or 6 months generally : only in exceptional cases it is stored for over a year. This as well as the manufactured cigars or cigarettes, if stored for long periods are attacked by an insect known as the cheroot beetle—*Lasiederme sernicerne*—and sometimes serious damage is done. The damage starts with the beginning of the monsoon, continues throughout the wet weather and declines by November. Very few factories or merchants have facilities for protecting their ware from this pest and in bad cases the material

is destroyed or steeped in hot water to kill the pest and used as fillings for fresh cigars, generally of an inferior type.

388. Clean storage of the material, constant attention and quick disposal will go a long way in minimizing the pest. Fourthly, it is stated that for want of sufficient skilled labour many of the orders received from overseas are cancelled and thus opportunities to improve the business in foreign countries are lost. This is a great handicap felt by all manufactures in India now. In America and in Europe, an increasing quantity of cigars is being made entirely by machinery. In order to help the manufacturers who desire to instal machines in their factories, detailed information is being gathered regarding the machinery required for the manufacture of cigars, its approximate cost and the names of the manufacturers in the United Kingdom or United States of America from whom it may be purchased.

Shade cultivation is one of the modern methods of tobacco cultivation and its purpose is to produce thin leaves. The sun shining on the tobacco plants helps them to draw the nutrition from the earth and they ripen quickly, the leaves having a tendency to be heavily bodied. In order to counteract these natural results and to produce large thin tobaccos with less nicotine contents, the tobacco plants are now grown under shade in some tobacco growing countries like Havana and the Sumatra islands. Such thin leaves help the manufacturer to produce light weight cigars which put him in an advantageous position in selling his products in overseas markets where import duties are assessed on weights.

389. The cigarette industry si a large-scale one. It uses a type of tobacco called 'Virginia', grown mostly in Guntur and to a smaller extent in the neighbouring districts of Kistna and East and West Godavari. Though the industry is a large-scale one, the preparation of the tobacco for the industry calls for curing and grading which are best done in one or a group of villages. At present the ryots cure the tobacco and divide the tobacco roughly into certain quality groups. They bring the tobacco to Guntur or Bapatla and sell it to the trade. Subsequently it is the trader that does the detailed sorting and grading. The extent to which these items of work can be done by the growers themselves deserves examination. A grower in a village or a group of villages can form themselves into a co-operative society for this purpose. If the grower sells graded tobacco his share of the final price will be greater.

Beedi manufacture

390. The manufacture of beedies is carried on extensively in several centres of the Province. It is carried on, on a small factory basis, in the districts of North Arcot, Kurnool, Chingleput, Salem, Trichinopoly, Madras, Malabar and South Kanara. Though tobacco and dry leaf for wrapping it come from other districts the industry is pursued in Malabar in several towns and villages, because of the supply of cheap labour indoors during the long rainy season. The

industry is in the hands of capitalists and the labour is mostly unskilled. Even small boys are employed in the industry. Wages are paid according to the quantity of work turned out. Rupee 1 to Rs. 1–8–0 is paid for 1,000 beedies produced and an adult worker can earn this amount. There is great demand for beedies throughout the year and the industry, therefore, provides continuous employment. Beedies find large sales particularly among labourers of different classes. The cost of producing 1,000 beedies is worked out below :—

	RS.	A.	P.
Cost of tobacco including tax	1	8	0
Leaves used as wrappers	0	10	0
Label, paste and paper	0	3	0
Yarn	0	0	3
Labour	1	6	0
Cost of production	3	11	3
Selling price	5	0	0
Profit for 1,000 beedies	1	4	9

Co-operative societies can improve the conditions of work and secure for the workers a larger share of the consumer price. But the societies will have to face strong opposition from capitalists in the trade who have established themselves solidly. Attempts made to organize a society for the workers in Kurnool district failed mainly owing to strong opposition from middlemen merchants.

Leather industry

Tanning

391. The hides and skins and leather industry is one of the most important industries in this Province judged by the test of production and export trade, the exports of leather alone amounting to about six crores of rupees a year. Tanning was one of the earliest industries besides agriculture, which developed in India. The village chammar was a social necessity in former days and it was his function to prepare the leather and leather articles required for the villagers. Though modern tanneries are growing in number, tanning as a cottage industry is still carried on by a few families of chucklers in many villages. They purchase poor quality hides and tan them in their houses or occasionally receive hide for tanning from ryots who pay them wages for preparing them. The 1931 census showed that there were 45,233 persons in the Province employed in this industry. But the village tanners are largely uninfluenced by modern practices and there is considerable scope for improvement in the methods adopted in the country tanneries throughout the Province. If the quality of the leather produced in the villages can be improved and better quality leather articles produced, there seems to be no reason why the leather and leather articles required by the villagers, i.e., footware for the villagers and

leather articles required by the agriculturists should not be produced in the villages themselves.

392. The Leather Trades Institute, Madras, functions as a centre for the provision of general advice, research and practical guidance to tanners. The leather research chemist has conducted a number of experiments of interest to tanners such as picking of hides and skins, preparation of improved leather for water buckets, proper use of synthetic tans, use of indigenous tanning materials like "Hopeaparvi flora", mangrove bark and casuarina bark. Bulletins have also been issued on subjects like pickling of hides and skins, and the proper use of synthetic tans. There is a peripatetic demonstration party under the tanning expert for the purpose of demonstrating improved methods of flaying, preserving and curing in villages and modern methods of tanning on a cottage industry basis. The demonstration party first commenced work during 1942–43 at Lepakshi in the Anantapur district, and in 1943–44 moved to Alur in the Bellary district. Twelve apprentices at each centre were trained in leather goods manufacture. Co-operative societies for leather workers are also attempting to develop the village tanning industry. The Madras Province has, in its forests, plenty of tanning barks and other tanning materials and the Leather Research Institute has conducted a number of experiments for their profitable exploitation in tanning. Myrobalam, an important tanning material, is exported in large quantities. One handicap of the village tanner is that he does not get good hides and skins for tanning. They are generally purchased by merchants and sent out to the tanneries. If the village tanner can be provided with good raw hides and skins, there are great possibilities for developing the tanning industry.

Leather goods

393. Shoe-making is one of the cottage industries that is carried on everywhere in the Province. There is a large demand for boots and shoes by the middle and richer classes and so in every important town there are found a few shops solely engaged in making boots and shoes of the European pattern. The workers are generally Chucklers by caste and are too poor to work in a shop of their own. Ordinarily they work as labourers in shops run mostly by Muslims. The average daily income of a worker ranges from Re. 1 to Rs. 2. Some skilled workers are paid up to Rs. 3 per diem. The most important centres for boot and shoe manufacture are Bellary, Trichinopoly, Mangalore, Bezwada, Madura and North Arcot. Besides shoes and boots, other leather articles such as bed straps, money purses, belts and bags are also made. Co-operative societies for leather workers have been formed at Madura, Kumbakonam, Madras, Ilayangudi (Ramnad), Ellore, Alur (Bellary) and Lepakshi (Anantapur). During 1944–45 they sold leather goods to the value of Rs. 82,206. The Leather Instructor appointed out of the Madras Provincial Co-operative Bank's grant for the development of cottage industries is training

the members of these societies in improved designs and methods of manufacture. There is scope for organizing co-operative societies for them at Trichinopoly, Rampet, Vellore, Chittoor, Tirupati, Bezwada, Mangalore, Virudunagar and Melapalayam (Tinnevelly).

Toys

394. Dolls and other toys are made in clay and lightwood in many places in the Province. But artistic and superior varieties of dolls and toys in wood, are largely made in Tiruchanur in the Chittoor district, Kondapalle in the Kistna district, Etikoppaka in the Vizagapatam district, Iravadanallur in the Madura district, Palakode in the Salem district, Lakshmigaripalli near Settigunta in the Cuddapah district and Ambasamudram and Mannarkoil in the Tinnevelly district. Painted clay dolls and toys are made in Bandipalayam and Panruti in the South Arcot district, Little Conjeevaram and Thandarai in the Chingleput district, Srirangam in the Trichinopoly district, Park Town and Purasawalkam in Madras. The articles produced include a variety of things such as imitation fruits and vegetables, animals, birds, insects, models of household utensils, Hindu deities, and the like. The toys produced in some of the places such as Kondapalle, Iravadanallur and Panruti have won more than a local name.

Wooden dolls and toys

395. Only light wood is used for dolls and toys. In Tiruchanur, Raktha Chandana wood and Palakara wood available in Mamundur and Karakambadi forests are used. Cheap jungle wood of light quality known as "Tellapoliki" is used in Kondapalle. It is obtained from the surrounding forests. "Ponnai" and "ilupai" wood are used in Palakode. "Ankudu" wood is used in Etikoppaka. Toys of Iravadanallur are made of wood locally called as "Palakotai." The dolls and toys are first turned in wood and later lacquered in various colours. Chisels of fine quality, files, saws, screws and the "kadasal" are the tools commonly used. The making of articles of superior quality requires dexterity and skill. The makers of dolls and toys are mostly persons belonging to a section of carpenters. In the Chittoor district Balija Chettis, in Tinnevelly, Pullavars otherwise known as Kadasalkāra Pillais, in Palacode (Salem), Muslims and in Kondapalle, Aryakshatriyas are engaged in the industry.

The demand for toys is almost continuous as they are purchased all through the year for children. It is larger, however, during seasons of festivals and fairs. The sales are usually the largest in the months of September and October every year, when the Hindu festivals of toys and dolls, "Navarathri Koluvu" takes place. The important markets for these goods are centres of pilgrimage. The toys of Tiruchanur are usually sold at Tiruvannamalai, Kalahasti, Bhadrachalam, Panderpur, Gadag, Gulbarga and Nasik. The Palacode toys are marketed in Bangalore and in some other places in Mysore. The toys of Etikoppaka and Kondapalle find

sales even in Bengal, the Punjab, Bombay and the Central Provinces. The war has given an impetus to the industry. The import of cheap dolls and toys has ceased and there is a growing demand for those produced in India.

The industry is organized on a co-operative basis at Tiruchanur, Kondapalle and Etikoppaka. Many of the workers in the first two places are members of the societies. The Etikoppaka society has been doing almost nothing. The workers of this place carry on the industry with borrowed funds. They borrow Rs. 100 to Rs. 600 at a time and repay the money in the form of toys and dolls at prices fixed by mutual understanding between the borrower and the lender. The creditor does not usually charge interest for the money lent and makes it up in the prices of the dolls and toys. In Palacode, a few carry on the work with their own funds. But most of the workers get the raw materials, viz., wood and paints, from master workmen to whom they are bound to sell the toys and dolls at prices fixed by the latter. In other places, the workers manage with their own funds, going only occasionally to middlemen. The workers get on an average 12 annas to Re. 1–8–0 a day, according to the skill involved.

396. Wooden toy making is an excellent side-line to carpentry or cabinet making. Similarly, metal toys can be made as a side-line to metal working and the smithy and soft toys can be produced by women and girls in their homes. The marketing of these toys can be arranged through co-operative societies. There are possibities of developing the industry, especially as there are no imports of toys from Japan now. But the industry requires considerable improvement in technique and design. Most of the toys are crude and old fashioned. The workers should adjust themselves to changing tastes and produce new varieties of toys such as aeroplanes, tanks, motor cars and steamers. The manufacture of wooden toys as adjuncts to wood-working courses has been introduced in industrial schools. Instruction in toy-making is also given in the School of Arts and Crafts. A few workers of the several centres in the Province, particularly members of toy manufacturers' co-operative societies, should be given intensive training in modern technique and new designs so that they may on their return to their centres teach other workers. A member of the Kondapalle Toy Manufactures' Co-operative Society in the Kistna district was trained in the manufacture of improved designs at the School of Arts and Crafts, Madras. He is training the other members to produce modern toys. There is a proposal to train a member of the Tirupati Toy Makers' Co-operative Society likewise. One other handicap from which the workers suffer is the difficulty in getting the light wood required for the industry. Wherever the workers have been organized into co-operative societies, convenient blocks of forest coupes might be leased out to the societies without auction on the average rental of previous

Clay dolls

397. The chief raw material required is clay and this is usually available at the centres where the industry is carried on or in their neighbourhood. Paints and varnish are purchased locally. The clay models are baked before they are painted and varnished and are modelled by hand or moulded. Usually clay models are made with moulds made of Plaster of Paris, cement or asbestos. For models of certain Hindu deities, copper plate moulds are used. The workers carry on the industry with their own funds. The marketing of the goods generally does not present difficulty and the part of middlemen in this trade is not so great as the case of wooden dolls and toys. The dolls and toys made at present are too fragile for transport and cannot be sent for long distances from the centres of production without very careful packing. There is scope for improving the industry by introducing new artistic designs to suit modern tastes and by making the dolls and toys stronger and more fanciful.

Ivory work

398. Working in ivory is carried on in the Vizagapatam district. The fine ivory carvings of the district have won wide fame. At Vizagapatam there are at present two workshops owned by Viswa Brahmans. In each of these shops about 5 workers are employed on a monthly salary of Rs. 40 to Rs. 60. Fancy articles such as ivory caskets, photo-frames, glove boxes, ladies work boxes, visiting card cases, fret and lace work on ivory, pictures of Hindu deities, miniature engravings of birds and animals, chess boards, book-stands, watch cases, cigarette holders are some of the articles made. The raw materials used are ivory, sandalwood, tortoise shell, stag and sambhur horns, and porcupine quills. They are purchased by the shop-keepers and given to the workers. The articles made are of high artistic value and are in great demand. The goods are sent to Bombay traders for sale on a commission of 10 to 20 per cent. But even this procedure does not help in finding a market for the goods. In 1939, there were 10 shops engaged in the industry but there are only two now. The industry is gradually decaying and perhaps in a few years it may disappear altogether, if steps are not taken to encourage the members to produce articles such as tie-pins, buttons, cuff-links, brooches and similar articles which will be within the reach of the middle classes, side by side with the production of artistic goods. As only about 10 persons are engaged in the industry and as the goods produced are costly and not in demand for everyday use, it will not be possible to organize it on a co-operative basis at present.

The match industry

399. There are a number of match factories in the Province both big and small. The industry is also pursued partly on a cottage basis in the districts of Ramnad and Tinnevelly. In these districts,

capitalists employ labourers and produce matches on a small scale. The industry partakes the nature of a cottage industry, because it provides work for men, women and children in their homes and most of the work is done without the aid of machinery. In the Tinnevelly district, it is carried on at Kadambur, Koilpatti, Kalugumalai, Kuruvikulam, Kadayanallur and Mukkudal. The centres in the Ramnad district are Sattur, Sivakasi and Elayirampannai. In Ramnad, about 2,000 children above 12 years of age and in Tinnevelly about 150 men, 350 women and 200 children are employed. The raw materials required are: (1) veneers and splints, and (2) chemicals. The veneers and splints are imported from Malabar and chemicals are purchased from local merchants, the Mettur Chemicals, or wholesale merchants at Madras and Bombay. Owing to the war, the prices of chemicals have gone up and at times are unobtainable. A part of the process of manufacture, viz., box-making and frame filling can be done by the workers in their homes, while the remaining process of dipping the splints with ignition tips, box fillings, band rolling and packing boxes in gross units are done in the premises of the workshop. The workers who take home the splints, veneers and paper make the boxes and fill up the frames. They are able to do the work in their leisure hours. Girls and women assist them in the process. For making boxes for match sticks, the usual wages are 4 annas per 1,000 boxes. For filling up six frames containing 30 planks with 60 to 70 splints each, two annas are paid. In the factory, the frames which have been filled in the houses of the labourers are levelled by hand on a levelling table and dipped in melted paraffin to a height of one-eighth of an inch. The paraffined frames are then dipped in the composition and allowed to dry in racks with heads downwards. The dipped splints are then packed into boxes. The sides of the boxes are painted with a mixture providing an ignition surface. These items of work are done by the staff maintained at the factory on a monthly salary. The small producers themselves are not rich men. The investment in the business by each producer usually ranges from Rs. 500 to Rs. 3,000. Most of them depend on commission agents for finance and marketing. The producers take cash advances from the commission agents for the purchase of raw materials and for purchasing "band rolls." The finished products are sold to the middlemen and the latter arrange to market them through agents and merchants, at other centres. The actual workers are only wage-earners. There is a large and continuous demand for matches and the war has given an impetus to the industry. Large imports of matches used to come every year from Burma and, when the imports from Burma ceased, there was a growing demand for matches produced in the Province. The matches find a wide sale in Madras, Mysore, Hyderabad, Bombay and the Central Provinces. There are a number of middlemen—commission agents, wholesale merchants and retail merchants—between the producer and the consumer. The producers are in the real sense of the term hardly capitalists. Their actual investment

is small, compared to the capital required for the business. It is this weakness that is responsible for the domination of the commission agents in the industry.

400. The economics of the industry is as follows :—

	RS.	A.	P.
For production of 100 gross of boxes with 60 sticks each—			
Cost of splints and veneers	112	0	0
Cost of chemicals	55	0	0
Wages and sundries	29	0	0
Total ..	196	0	0
Cost of one gross	1	15	0
Tax at Rs. 3 less rebate of Rs. 7-13-0 per 100 gross	2	15	0
	4	14	0
Cost price per gross	4	14	0
Wholesale price to middlemen	6	0	0
Retail price to consumers	6	12	0

401. The possibilities of organizing the producers in Ramnad district into a co-operative society with a view to associate with them the actual labourers also were examined by the Co-operative Department in 1939 but the proposals could not be pushed through for the following reasons :—

(1) The producers themselves were not in a position to contribute sufficient share capital to raise the necessary funds;

(2) the sales of matches by the commission agents were on credit and the society which was intended to replace them had also to follow a similar method for marketing; but this was too great a risk for a co-operative society;

(3) with the elimination of the commission agents who had organized the markets and practically controlled them, it was doubtful if the society could easily market their goods;

(4) the rebate of 10 pies in the rupee in excise duty given to the small manufacturers making less than 100 gross of boxes a day, would not be continued, if a number of producers joined together and got their finance from the same institution; and

(5) above all, the prices of the chemicals had gone up on account of the war and the conditions were not favourable for starting a society of the kind contemplated.

A beginning has been made by the Madura-Ramnad wholesale society in financing one of the producers and in marketing the goods produced by him on a commission basis. In Gudiyattam in the North Arcot district the manufacture of match splints and veneers is carried on, and the splints and veneers are sold outside the district in large quantities. The match industry can be organized in this place on a cottage industry basis. There would also seem to be possibilities of organizing the industry in the Circars, if suitable wood for splints and veneers can be had in the Agency forests.

The button industry

402. The button is an article in great demand. Large quantities of it are imported into our Province every year. Buttons can be manufactured on a cottage industry basis as the industry does not require great skill and the process of manufacture is simple. The implements required are few and not very expensive. A treadle lathe, a drill for making holes and a chisel are the only appliances that are required and they cost about Rs. 150. Buttons are generally made of wood, coconut shell, bone or horn and the raw materials can be obtained in any locality with ease. It is suited for a home industry at which women can work. The demand for buttons being great, marketing does not present much difficulty. There are four classes of buttons, viz., coat buttons, shirt buttons, collar studs and cuff-links. In this Province buttons are mostly made of bone, wood and coconut shell. Beautiful and artistic ivory buttons are manufactured in the States of Travancore and Mysore and metal buttons in the Hyderabad State. The industry is confined to three centres in the Province, viz., Tiruppanangadu in the North Arcot district, Salem town and Vinayashramam in the Guntur district. Even in these centres the output of buttons is small. At Tiruppanangadu, it is about Rs. 1,200 worth a year and at Salem about Rs. 15,000. At Vinayashramam the daily output is only about 200 buttons. The Ashramam maintains a machine and a skilled worker with one or two other workers to assist him. At Tiruppanangadu, the industry is carried on by the Tiruppanangadu Button Manufacturers' Co-operative Society and by two other private dealers. The society owns 9 sizing machines and 9 members work for wages. The Co-operative Society has been working successfully and this is largely due to the financial assistance given to the society by the Government. In Salem, about 50 persons are engaged in the industry as workers under master workers. The average daily income of a worker in this industry ranges from 12 annas to one rupee. The economics of the industry is as follows :—
For the manufacture of one gross of buttons—

	Bone buttons.			Wooden buttons.		
	RS.	A.	P.	RS.	A.	P.
Raw material	1	0	0	2	0	0
Chipping labour and wages ..	1	12	0			
	2	12	0			
Selling price per gross	3	0	0	2	4	0
Profit per gross	0	4	0	0	4	0

A worker can manufacture on an average about one gross of buttons a day. If a cottage worker does the chipping of the raw material and the entire process of manufacture, he can get about Rs. 2 per diem. In the case of master workers, the daily income depends on the daily output, at 4 annas for every gross of buttons.

The button industry is a profitable one; and, with a little knowledge of the handling of the treadle lathe, the industry can be carried on as a home industry. There is great scope for the

development of the industry provided sufficient enterprise is available, and encouragement is given. At present it is not carried on in the Province to any large extent principally because the public are ignorant of the simple process of manufacture, and lack the necessary direction and initiative. The Industries Department have lathes at the Madura, Madras, Calicut and Bellary Industrial Schools for demonstration purposes and those who are interested in the industry are permitted to see the working of the lathes. But this does not seem to be enough. It will greatly facilitate the development of the industry if the process of manufacture of buttons is demonstrated at several important centres of the Province and a number of persons are trained so that they will pave the way for the organization of co-operative societies for button manufacturers.

Palmyrah jaggery

103. The manufacture of jaggery from palmyrah sweet toddy is carried on as a cottage industry on a large scale by Nadars in the Tinnevelly district, by Kalais in the West Godavari district, by Sanars in the Chingleput and Coimbatore districts, by Thiyyas in Malabar, by Billavas in South Kanara and by Goundlas in the Nellore district. When prohibition was introduced in the districts of Salem, North Arcot, Chittoor and Cuddapah, the toddy tappers who were thrown out of employment took to this industry as a means of livelihood. But after the removal of prohibition, most of them have again reverted to their old occupation of toddy tapping, which is more remunerative to them. Men, women and even children are employed in the palmyrah jaggery industry. The process of manufacturing jaggery from sweet toddy is not complicated. Sweet toddy is obtained from trees of 10 years' standing and it is boiled in pans after adding a little lime and coconut oil, proportionate to the juice. The juice is not generally purified before manufacturing jaggery with the result that the quality of the jaggery is not good. Each tapper can tap about 60 trees a day. The jaggery is either sold as such to the consumers or is sold to sugar refineries for conversion into white sugar. The Industries Department has carried out demonstrations on the improved methods of preparing jaggery in a number of centres in the Province for the benefit of the tappers. In the West Godavari, Nellore, Chingleput and Tinnevelly districts, the industry is carried on in the months of February to June while in South Kanara, Malabar and Coimbatore it is carried on from October to May. The industry is not organized in any district. Co-operative Societies for the workers have been organized only in a few centres in the Province. At present there are 77 such societies. The industry is carried on by the members of each family or by a group of four or five persons. Many of them do not own trees. They obtain leases of the trees for payment of money or a portion of the jaggery manufactured. The workers being poor, generally obtain advances from middlemen and merchants in the trade, and

bind themselves to sell the jaggery to them. In the West Godavari district, there are a number of such middlemen who have contact with the agents of Messrs. Parry & Company, who purchase practically all the palmyrah jaggery produced in the district. The workers mostly depend on these middlemen for finance and sell the jaggery to them. The economics of the industry is as follows: (West Godavari district):—

For producing five candies of jaggery (each candy of 504 lb.)—

	RS.		RS.
Tope rentals ..	30	Pots	5
Lime	10	Other implements	10
Fuel	15	Commission to dealers ..	5
Coconut oil ..	5		—
Stores	5	Total ..	99
Pan for boiling ..	14		—

Price of 5 candies at Rs. 36-8-0 per candy, excluding gunnies .. Rs. 182-8-0
Net income 83-8-0

The sum of Rs. 83-8-0 represents the income of the tapper and his family for the season from February to June, i.e., for 5 months.

Owing to the conditions created by the war, there was a general shortage of supply of sugar in the Province, and the palmyrah jaggery industry received an impetus. Now that the war is over, the demand for palmyrah jaggery is likely to go down gradually and the industry needs help. Those engaged in the industry should undertake improved methods of manufacture. The success of the Peravali, Vadavanur and Kavittam societies has proved that the co-operative method is probably the best. The existing societies should bring within their fold more producers.

Cotton ginning and pressing

404. The ginning and pressing of cotton is an important subsidiary industry to agriculture and is carried on in the several ginning and pressing factories spread throughout the major cotton growing tracts. The Province has in all, about 500 ginning and pressing factories, a very large percentage of which are non-seasonal in working. The largest number is found in the Coimbatore, Bellary and Tinnevelly districts, which have the largest areas under cotton. The number of persons employed in all the ginning and pressing factories is over 27,000. Ginning by hand is also carried on to some extent in villages. It has not been possible to estimate with any reliable accuracy, the number of people employed in this operation, but the number must be considerable with the development of the khadi industry. It is proposed to start co-operative ginning factories in several districts and eliminate the profit to the middleman arising from the process. It is anticipated that this will increase the income to the cotton grower by nearly 30 per cent.

The oil pressing industry

405. Oil-pressing is an important industry which serves a large section of the population, as oil forms one of the principal items of diet. It is carried on as a family occupation by a class of people known as "vaniyars" or oil-mongers, whose hereditary profession is crushing and selling oil. Oil-mongers are found throughout the Province. Oil-pressing is done by them from gingelly, castor, coconut and groundnut seeds in ghannies or wooden mills (chekkus) driven by a pair of bulls. The mill in use is the common pestle and mortar type, consisting of a fixed wooden mortar, inside which revolves a wooden pestle leaning against the sides of the mortar. The seed is crushed between the pestle and the mortar, and the pressure is regulated by attaching a weighed wooden lever to the pestle. A pair of bulls is yoked to this lever and by this means the pestle is made to revolve in the mortar. The process is fairly effective in crushing out oil and has been followed from time immemorial. The "poonac" or oil cake is utilized as food for cattle and as manure. The kind of oil pressed in different districts depends upon the oil seeds grown there or in the neighbourhood. In Malabar and Tanjore the chief oil extracted is coconut, while in the circars and parts of the south gingelly oil is largely extracted. In Ramnad, South Arcot, Coimbatore and other places where groundnut is grown in large quantities, groundnut oil is pressed both for consumption and export. In the Ceded Districts, castor is grown in abundance and castor oil is pressed in the country ghannies. In some places margosa and "illuppai" seeds are pressed. The advent of oil mills has affected the indigenous oil-pressing industry; but the latter is still carried on in a number of places. Oil-pressing in ghannies driven by bulls is called the cold process. It is believed that the oil extracted by the cold process in ghannies retains its nutritive value, while mill extracted oil loses much of it. There is also the belief that the oil extracted in wooden chekkus is better in point of taste and odour than the oil pressed in iron ghannies by mills. One great disadvantage with the country chekku is the cost of maintaining the bulls. The animals used for this work deteriorate rapidly. Further the yield of oil is greater in oil mills and the cost of pressing oil is also cheaper. At the third session of the Industrial Research Council held in Bombay in July 1937, it was decided that certain major industries in the country should be selected for detailed industrial surveys and that these surveys should be conducted by the Provinces or States concerned and co-ordinated by the Industrial Research Bureau of the Government of India. It was decided that the survey of oil seeds industry should be first taken up. The importance of the industry in this Province can be appreciated from the fact that Madras grows 47·7 per cent, 19·3 per cent and 15·2 per cent of the total area under groundnut, castor and gingelly, respectively. In 1938–39, the Government sanctioned a special staff to carry out a survey of the industry under

the supervision of the Superintendent of Kerala Soap Institute. The report showed that there were in the Province, 30,068 country chekkus representing a capital investment of about Rs. 16 lakhs, with a crushing capacity of 450,000 tons of seeds, and 238 power mills representing a capital investment of about Rs. 115 lakhs, with a crushing capacity of about 500,000 tons. But the actual quantity of seed crushed in both sections of the industry, was only about half the crushing capacity. The report has revealed that there is a great deal of latent crushing capacity lying unutilized and that additional demand for oil can be met by operating the chekkus and mills for longer periods. Large quantities of groundnut are exported from this Province. [1] As the Royal Commission on Agriculture observed, by the export of so large a proportion of its production of oil seeds, there is considerable loss to India of the valuable source of combined nitrogen in the oil cakes. If the latent crushing capacity of mills and chekkus in this Province is utilized fully, large quantities of oil cakes, can be retained in this Province and the whole of the nitrogen contained in them returned to the soil in the form of manure. [2] The Commission stated, "an extension of the oil-crushing industry would undoubtedly tend to promote the welfare of Indian agriculture and we would commend the investigation of its possibilities to the earnest consideration of all local governments."

406. At present the capital outlay involved for a bullock-driven chekku is about Rs. 400 to Rs. 600; the woodden chekku costs about Rs. 150 to Rs. 200 and a pair of bullocks costs about Rs. 300 to Rs. 400. The outturn in country ghannies is almost the same everywhere, varying from 35 to nearly 38 per cent of the seeds pressed. The yield of oil to a great extent depends upon the quality of the seed crushed.

Gingelly oil

(Two tins of oil.)

	RS	A.	P.
63 Madras measures of gingelly seeds	43	0	0
Jaggery	0	12	0
Labour charges and cost of maintaining bullocks .	2	8	0
	46	4	0
Cost price of one tin of oil	23	2	0
Sale price of one tin of oil	24	0	0
Margin of profit	0	14	0

Ordinarily a wooden chekku worked by a pair of bullocks for six hours can crush about 30 to 35 Madras measures of seed. Therefore, by working a wooden chekku the oil monger gets about

[1] Royal Commission on Agriculture in India 1928 (Abridged Report), page 87.
[2] *Ibid.*, page 89.

14 annas a day in addition to oil-cake which may fetch him Re. 1-8-0 to Rs. 2.

Groundnut oil

	RS.	A.	P.
Groundnut 171 lb.	21	8	0
Labour charges	2	8	0
Total .	24	0	0
Cost price of one tin of oil	12	0	0
Selling price of one tin of oil	13	0	0
Margin of profit	1	0	0

In addition oil-cakes may fetch about Rs. 2 per tin of oil produced.

407. With a view to overcoming the disadvantages of a bullock-driven chekku, the Department of Industries has evolved a power-driven wooden chekku, known as the " Pinto chekku ". In this machine, the mortar revolves, while the pestle is held fast. The percentage of extraction on gingelly seed varies from 40 to 44 according to the quality of seed crushed. One power-driven wooden chekku can crush about 360 lb. of gingelly seed in 12 hours. In places where electric energy is available, a motor can be employed as the power unit. While possessing the advantages of the bullock-driven chekku in respect of yielding pure and wholesome oil for edible purposes and good " poonac " for cattle food, this power-driven chekku has to a large extent overcome the defects of the former. It requires a quarter of the floor space necessary for the bullock-driven chekku and its outturn is more than double, while the cost of extraction is about 50 per cent less. Driving an ordinary country chekku imposes a very severe strain on bulls. Two pairs of bulls are required to run a chekku for 12 hours a day and the bulls are unfit for any work at the end of about two years.

The industry can be developed by co-operative organization. The oil-seeds required may be purchased at one time during the harvest season and distributed to the members of the society according to their monthly requirements. The co-operatives can also advance the funds required for setting up the improved Pinto chekku and arrange for the marketing of the oil. The societies themselves may also press oil and sell it on a co-operative basis. The Gandhiniketan Village Industries Co-operative Society in the Madura district owns three country wooden chekkus and a pair of bulls and has undertaken the crushing of oil seeds such as gingelly, groundnut and castor. During 1944–45, it produced oil worth Rs. 4,293 and sold oil to the value of Rs. 3,996.

Eucalyptus oil

108. The manufacture of eucalyptus oil is carried on extensively in the taluks of Ootacamund and Coonoor. It is prepared from the leaves of the eucalyptus trees which are grown largely on the plateaus of these two taluks. There are no definite centres of production of this oil. The distilleries are moved from place to place according to the availability of leaves. There are about 50 such production centres within a radius of about 10 miles from Ootacamund and Kotagiri. At each centre, about three or four persons are engaged in the industry. The manufacturers are chiefly the tree tappers of North Malabar who are adepts in climbing lofty trees, for the leaves have to be gathered from these trees which are about 100 to 200 feet high. They have settled in the Nilgiris, with the manufacture of this oil as their primary occupation. The industry is carried on by men, but women are also employed some times for the transport of leaves. There are two kinds of eucalyptus trees, viz., the blue gum trees and the red gum trees. The leaves of the red variety are not preferred, as the oil extracted from them has a disagreeable odour. Tender leaves are not used as their oil content is little. In order to regulate firewood supply, the Collector of the Nilgiris has ordered that no eucalyptus trees should be cut or the leaves removed without his permission. According to this order, leaves can be cut only from those trees which have been marked for cutting. The actual workers have no capital of their own to carry on the industry. They are financed by the wholesale merchants at Ootacamund, Coonoor and Kotagiri. They take advances from these merchants and return them in the shape of eucalyptus oil at prices which are fixed by the merchants at the time of making advances. The process of manufacture of the oil is simple. Leaves of mature trees are collected and dried for 3 days before they are put into the still. Leaves dried in the shade are preferred, as the yield of oil is greater. A still about 5 feet high and 3 feet in diameter with copper bottom and iron sides is commonly used. Sometimes iron and zinc stills are used. At a foot above the bottom, arrangements are made inside the still to hold a perforated iron plate over which the leaves are placed so that the latter may not come in direct contact with the heat. The space between the bottom of the still and the perforated plate is filled with water before heating commences. The lid at the top of the still is tightly closed and the vapour is allowed to escape through a pipe which empties itself in an adjoining vessel, after passing through a column of cold water. When the vapour condenses, it turns into oil containing a large percentage of water. The oil being lighter floats on the surface. The water below is removed by means of a tap at the bottom of the vessel. Generally boiling is done for 8 hours, but during that period water in the still is maintained at the same level by constant addition as it evaporates. The still costs about

Rs. 200 now. In the pre-war days it could be had locally for about Rs. 50. The economics of the industry is as follows :—

Cost of 500 lb. of leaves to produce—

	RS.	A.	P.
Three bottles of oil	5	0	0
Wages for 3 people for a day	5	0	0
Sundries and wear and tear	1	0	0
Total ..	11	0	0
Selling price to wholesalers	12	0	0
Retail selling price	13	8	0

The workers engaged in the industry get about Rs. 2 a day each.

The organization of the industry is entirely in the hands of the merchants. As the demand for eucalyptus oil is great and continuous all through the year, there are possibilities of developing the industry by organizing marketing through co-operative societies. The societies can also ensure oil of a better quality comparable with the Australian oil and build up a reputation for the Nilgiris oil.

Bee-keeping

409. Honey bees belong to one of the three important classes of insects which yield products useful to men, the other two being silk worms and lac insects. They yield honey and wax. Bee-keeping is a home industry which can be carried on by all people. It requires very little labour and no extra space, and can be carried on with a small capital outlay as a subsidiary industry or as a hobby. The appliances required are few and inexpensive. A hive and an extractor are the only important requisites. A bee hive can be locally made at a cost of about Rs. 5. The honey extractor costs about Rs. 7. But it is not necessary that every person who keeps a bee hive need have an extractor as honey is extracted from the hive at intervals and not daily. A group of persons can have one extractor or if they are members of a co-operative society, the society can have an extractor or two for the common use of all its members. The hive can be kept on the verandah or near the windows of the house. All one has to do is to see that the hive is free from ants, wax moth, and caterpillar, and that it is protected against the enemies of bees, viz., the lizard, the bee-eater and the King Crow. The industry does not require great skill and the training required is not of a complicated or taxing nature. A working knowledge of bee-keeping can be gained in a month. After gaining some experience a person can manage a number of hives. There is no necessity to cultivate specially any pasturage or plants for bees, as the bees make use of the available pasturage and plants in existence. There is no dearth of bee pasturage and plants in many districts of the Province. The flowers of most crops, plants and trees have pollen and nectar. Margosa, coconut,

palmyrah, tamarind, mango, drumstick, plantain, brinjal, chillies, cholam, kambu, castor, cotton, coriandar, gingelly, sunflower and all the gourd family, are some of the bee plants and trees. The antigonon creeper, however, is best suited for bee-keeping, as it produces plenty of flowers with nectar and pollen and blossoms almost throughout the year. The plant can be propagated by seed or by planting a part of its stem.

410. Bees gather honey in their combs for their food in the winter months, when they cannot fly out and forage. There is no honey flow in the fields and gardens during the cold months either, except in the case of plants such as the antigonon creeper which blossoms all the year round. During the honey flow season, which is the summer season, the bees take the earliest opportunity to store honey in their combs and merely work in the fields for their daily bread during the rest of the season, falling back on their stores during the cold season. Therefore if from a domesticated colony of bees, the first store is removed, the bees will start storing again and will do so every time their store is lost, provided, of course, such losses occur within the honey flow season and there is sufficient time for them to collect finally. There is flow of honey for nearly six months from April to September, though the months of May to July are usually the periods of heavy flow. During the honey flow season bees do not require any feeding, unless there is no storage of honey in the hive or there is a bad season. Extracted honey can be given after diluting it with water in equal proportions. Sugar syrup, i.e., sugar diluted in water, can also be given. Honey and bees wax are obtained from the industry. Honey can be used both in its natural state and as cooked food. In this Province as well as in the rest of India, it is generally used as uncooked food. It can be used in place of sugar for preserving fruits. In Ayurvedic medicines it is used as a cure for a number of ailments. Bees wax is very valuable and it is widely used in Ayurvedic medicines. It is used also in the manufacture of jewellery and for polishing wooden furniture. Apart from yielding honey and wax, bee-keeping is beneficial to farmers, as it helps better production of crops, for bees aid pollination. The industry can, therefore, be combined with fruit growing, flower gardening and with agriculture, generally.

411. The apiary at the Agricultural College, Coimbatore, has been the centre of research on various aspects of bee-keeping. Besides research, propaganda to popularize the industry is being done by the department. Help and advice to improve the industry where it exists and facilities for its introduction in new areas are given. In some districts there are special demonstration apiaries for training local enthusiasts. At Coimbatore a special staff of an assistant and a fieldman are carrying out research and teaching work under the guidance of the Government Entomologist. Propaganda work in the mufassal is done by Agricultural Demonstrators and

particularly by the Entomology-cum-Mycology Assistants who are trained in bee-keeping and stationed in the districts. Temporary schemes in bee-keeping have been sanctioned for Vizagapatam, West Godavari and Chittoor under District Agricultural Officers. In all these districts, a fieldman assisted by a skilled messenger is giving necessary help, advice and training to persons interested in the industry. There are also special bee messengers employed under the Entomology-cum-Mycology Assistants in the districts of East Godavari, Madras, North Arcot, Tinnevelly, Chingleput and Nellore. To give an impetus to the industry, the annual honey week is organized throughout the Province when attention is concentrated on popularizing the industry. A bee hive with the necessary appliances and posters is displayed at most exhibitions and fairs. At the apiary under the Government Entomolgist, Coimbatore, a course in bee-keeping is conducted for persons interested in the industry. Information on bee-keeping is also made available through priced publications and free pamphlets in English, Tamil and Telugu, e.g., " Bee-keeping in South India ", and " Practical Hints on Bee-keeping ". The Agricultural department also arranges for the manufacture and supply of standard appliances to those who want to take up the industry. There are now numerous bee hives all over the Province. A census, taken by the Agricultural department, of the bee-hives maintained in the Province shows that during the past eight years there has been steady progress in bee-keeping.

Year.		Number of hives.	Year.		Number of hives.
1936	..	1,008	1940	..	5,999
1937	..	1,754	1941	..	7,530
1938	..	2,892	1942	..	8,749
1939	..	4,323	1943	..	10,267

These hives are maintained generally by private enthusiasts. Bee-keeping activities are mostly centred in 17 districts of the Province, viz., Vizagapatam, East Godavari, West Godavari, Kistna, Chingleput, Chittoor, Tanjore, Trichinopoly, Madura, Tinnevelly, Ramnad, Salem, North Arcot, Coimbatore, the Nilgiris, Malabar and South Kanara.

412. While the industry does not make a heavy call on the bee-keeper's time and involves only little labour and capital, the income derived from the industry is greater than the income from several other cottage industries. Under very favourable conditions of pasturage, a hive can yield up to 15 lb. of honey per annum. But allowing a margin of 5 lb. for desertion by bees and other handicaps a hive can be safely estimated to yield not less than 10 lb. of honey. Wax to the value of eight annas can also be obtained

from a hive in a year. It is possible for a person to manage 6 to 12 hives. The economics of an apiary of six hives is as follows :—

Capital cost

	RS.
Cost of 6 hives at Rs. 5 each	30
Cost of extractor	10
Cost of purchasing parent stock at Re. 1 each	6
	46

Income

	RS.
Yield from 6 hives at 10 lb. per hive per annum or 60 lb. of honey at Re. 1-4-0 per lb.	75
Bees-wax at 8 annas worth of wax per hive	3
	78

Expenditure

	RS.
Though the bee-keeper can himself manage the apiary assuming that he engages labour now and then to assist him, the expenses may be estimated at	5
Sugar syrup for feeding bees	1
	6
Net annual income from 6 hives	72
Net annual income from one hive	12

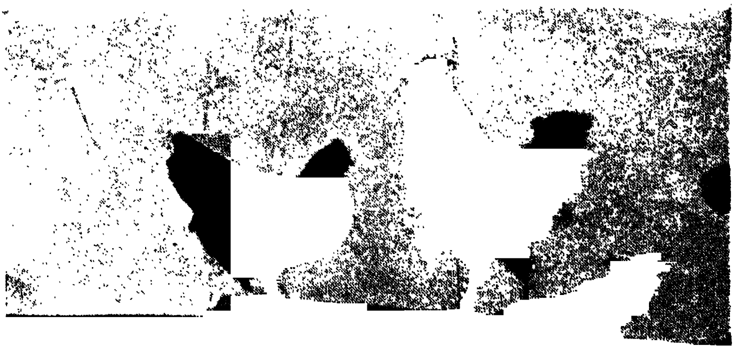
For a person belonging to the lower middle class this supplementary income is by no means a small one.

There are at present 10 co-operative societies in the Province for bee-keeping and honey production, viz., at Chengam in the North Arcot district, at Kokaloor in the Chittoor district, at Razole, Pithapuram and Tatapudi in the East Godavari district, at Tanuku in the West Godavari district, at Usilampatti in the Madura district, at Puthur in the South Kanara district and at Mayavaram and Tirukattupalli in the Tanjore district. In 1945, these societies had a membership of 588 and during 1944–45 marketed honey produced by their members to the value of Rs. 821. Experience of the co-operative society at Tirukattupalli has shown that the society thrived well so long as there was a bee messenger. There is great scope for organizing more co-operative societies for bee-keeping and for expanding the business of the existing ones, if a bee-messenger is given to each society or to groups of societies in compact areas. This assistance will be necessary till the societies expand business sufficiently and are able to stand on their own legs without outside support.

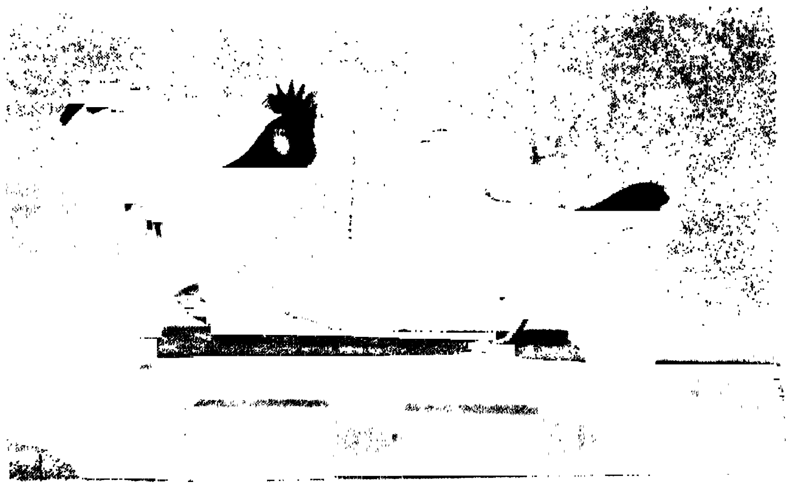
Poultry farming

413. Poultry farming is a profitable subsidiary occupation. The consumption of eggs and poultry has been steadily increasing and these products now play an important part in the nutrition of the population. Eggs particularly are of high nutritive value and are

WHITE LEGHORN—COCK AND HEN



RHODE ISLAND RED—COCK AND HEN



BLACK MINORCA—COCK AND HEN

one of the protective foods for human beings. There is growing demand for eggs and poultry. Poultry keeping which used to be a side-line of farming in European agriculture has, since the war, become a profit making business. It does not make a heavy call on one's time. The birds are docile and easy to manage. Even women and children can look after them. It is within the scope of everybody. Even a small farmer can keep a few fowls with advantage. People in big cities and towns too can maintain a few birds. Poultry keeping as a side line to agriculture has distinct advantages. The birds subsist on the shred grains in a newly harvested field and on the enormous quantities of waste products, grains and vegetables on the farm. They eat the insect pests and grubs in the fields that may not be noticed by the farmer and thus assist him to eradicate the pests which might damage the prosperous crop. In the case of a young crop, they can be let into the fields when the crop is a foot high. They will get plenty of worms and insects, which would otherwise do a lot of harm to the growing crop. In this way, the birds get an unlimited range and the food bill for the farmer on their account is reduced considerably. Poultry manure is very valuable to crops, especially for fruit trees. The industry is not very expensive and one can start in a small way with a couple of birds and gradually add more birds. They are housed in a variety of ways in cages, cattleyards, outhouses, and in fact, in any space available. But if profitable results are required, a good poultry house is essential. A hen can be expected to lay about 8 to 10 eggs per month and the price of an egg ranges from Re. 0-1-6 to Re. 0-2-6. The income from one hen in a month, therefore, comes to Re. 0-15-0 to Rs. 1-9-0. Under village conditions, it does not cost more than 3 annas per month to feed one hen and the net income, therefore, from one hen is roughly Re. 0-12-0 to Rs. 1-6-0. But to improve production and to develop the industry, pedigree fowls should be reared. The following is the economics, in normal times, of a poultry farm consisting of 20 hens and two cocks—indigenous hens headed by Rhode Island Reds or White Leghorn cocks. The number may be proportionately increased or decreased with the space, housing accommodation and funds available.

Capital expenditure

	RS.
20 hens at Rs. 1-8-0 per bird ..	30
2 Exotic cocks at Rs. 5 each ..	10
4 sitting houses for hens ..	15
2 Feeding troughs ..	6
2 Chicken feeding troughs ..	4
1 Chicken box ..	15
1 Chicken run ..	10
1 Egg tray ..	5
Sundries like water pots, brooms and locks ..	5
Total ..	100

414. No provision is made for portable poultry houses to house the adult birds. It is possible that there will be some suitable clean, sanitary and well ventilated place for the purpose with sufficient protection against predatory enemies of fowls. If no such accommodation is available, provision for two portable poultry houses at a total cost of Rs. 150 should be made. Similarly, no provision is made for enclosed poultry runs for adult birds, the idea being to rear them under ordinary village conditions. But the fear of disease is so great that it is advisable to have these runs with the added advantage of conducting poultry farming under controlled conditions. Uneconomic birds could also be spotted out and eliminated. One such run measuring 50 feet by 25 feet with wire netting will cost about Rs. 50 in normal times.

Recurring expenditure

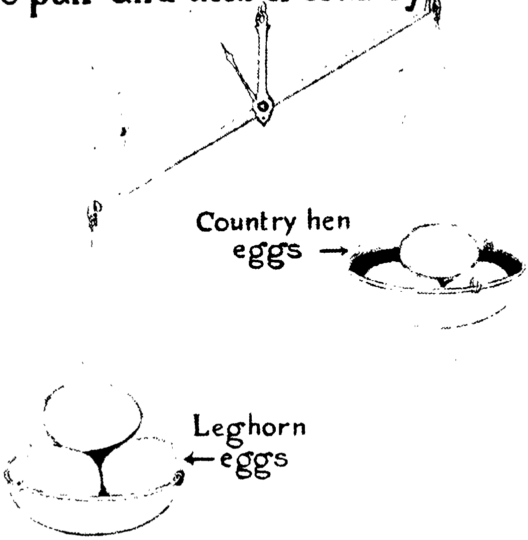
	RS.	A.	P.
Feeding charges of 22 adult birds, for one year at 3 annas per bird per month under village conditions	49	8	0
100 eggs may be set for hatching in a year out of 60 chicks may be expected; allowing 20 chicks for mortality, a balance of 40 chicks will survive and may be reared on an average for six months at 2 annas per bird per month	30	0	0
Total ..	79	8	0

It should be possible to keep down the feeding charges lower still with home grown grains like cumbu, cholam, ragi and paddy and household scraps and waste grains in fields and thrashing floors.

415. Eight eggs per bird per month may be estimated. Thus 1,920 eggs will be collected in a year out of which an allowance of 20 eggs will have to be made for breakages and 100 eggs will be set for hatching. The balance of 1,800 eggs or 150 dozen eggs can be sold. At the present price of eggs, viz., Re. 0-1-6 each, the 1,800 eggs can be sold for Rs. 168-12-0. But in normal times, a dozen eggs cost Re. 0-8-0 only and the cost of 150 dozens comes to Rs. 75.

Out of the 40 chicks reared, 20 will be pullets and 20 cockerels. The pullets can take the place of adult birds. The old hens and the cockerels may be sold. The sale of 20 hens at Rs. 2 per hen will fetch Rs. 40. The sale of 20 cockerels at Rs. 1-8-0 per bird will fetch Rs. 30. In normal times the 40 birds can be sold for Rs. 35 only. Thus the total income in normal times is Rs. 110 and at the prevailing high rates Rs. 238-12-0. In normal times the profit is Rs. 30, and in the prevailing conditions it is Rs. 159-4-0. Allowing a margin for feeding the birds at enhanced rates under the prevailing conditions, the profit may be estimated at Rs. 130 to Rs. 140. The graded hens in the second year will lay more eggs

A balance showing eggs of improved fowls on one pan and that of country in the other



1. Eggs of improved variety of fowls weigh more than country hens' eggs.
2. A white Leghorn egg weighs 2 oz and that of a country hen weighs 1 to $1\frac{1}{4}$ oz.

and thus bring in increased income. These graded pullets should again be mated to purebred exotic cockerels and thus the grading up should be kept on. There will come a stage when the hens in the farm may be laying 150 to 180 eggs each per annum. To avoid in-breeding, one can exchange one's purebred cockerels for purebred cockerels of others, taking care not to bring in disease into the flock by this bargain.

416. The Veterinary department is concerned with the development of poultry farming in this Province. The department has a poultry section attached to the Livestock Research Station at Hosur and the Lam Livestock Farm at Guntur. There is also a Poultry Research Station at Madras. In all these poultry stations, hybrid cockerels are maintained for supply of cockerels and setting eggs to districts for breeding purposes. The Hosur Poultry Station has about 1,000 exotic birds including White Leghorns, Rhode Island Reds and Black Minorcas. Cockerels and setting eggs are sold at concessional rates by these poultry stations to ryots and others interested in poultry-keeping. The Government have recently sanctioned three more poultry farms in the mufassal and two poultry development centres in Madras City. With a view to popularizing poultry farming as a side line to agriculture, demonstration units of foreign breeds of poultry have been kept in 24 veterinary institutions in the Province. These units also sell setting eggs at concessional rates. A scheme for the improvement of poultry farming in certain areas of the North Arcot district by supply of setting eggs and cockerels of pure imported breeds to villagers at concessional rates has been sanctioned by the Government. The scheme is being worked by the American Arcot Mission at Katpadi with financial aid from the Government. The scheme provides for the American Arcot Mission supplying every year for sale to the villagers 200 cocks of foreign breed which are not less than 6 months old at a price not exceeding Re. 1 each, supplying superior eggs for setting purposes at two annas each, opening six model poultry farms within a distance of 25 miles from Katpadi where cocks and setting eggs will be sold at the same rates as at the Katpadi Central Farm, holding exhibitions and organizing competitions once a year at Katpadi and at each of the six model village farms, awarding prizes for the best stock, equipment and eggs, exhibited, and conducting demonstrations in shandies in and around Katpadi. Besides the large poultry farm maintained at Katpadi by the American Arcot Mission, there are very few poultry farms in the districts. But a large number of persons have been keeping a few fowls chiefly for their consumption and in some cases for sale. The breeding of improved poultry is encouraged by the Government by giving cockerels as prizes for the best calves born to bulls maintained under the premium scheme, by the sale of setting eggs at concessional rates to ryots and Poultry Farming and Egg Production Co-operative Societies and by grants towards the cost of prizes awarded at poultry shows and exhibitions. The Government have also

granted liberal subsidies to Poultry Farming and Egg Production Co-operative Societies. The good results achieved by the Katpadi Egg Marketing Co-operative Society and the Tangutur Egg Marketing Co-operative Society show that with adequate financial assistance there are possibilities of developing poultry farming in this Province through co-operative efforts.

Sheep-breeding

417. Madras is the most important sheep-breeding Province in India from the point of view of numbers. Sheep-breeding is carried on in all parts of the Province, except in the very wet districts on the West Coast, where goats are more prominent. "The general importance of sheep appears to be associated with the rainfall distribution of the Province, which is better suited to them than it is in most other parts of India." In Madras, sheep are found in largest numbers in those districts where the South-West Monsoon is light. Salem, Coimbatore, Trichinopoly, Nellore, Cuddapah and Anantapur are the districts where more than half the sheep population of the Province is found. The total number of sheep in the Province according to the December 1944 census was 10,569,189. Many factors like the availability of uncultivated land, equitable climate, moderate rainfall, cheap labour and a fairly good market have influenced the development of the sheep breeding industry. But the industry has not received the attention which it deserves as it is in the hands of a class of people who are not only poor but also conservative.

There are two chief classes of South Indian sheep, the woolly and the hairy. The Bellary, the Coimbatore and the Kolar sheep belong to the woolly variety. The Bellary sheep is found in the Ceded Districts and its colour is a mixture of black and white. Its wool is coarse and the average yield is between 1 to 1½ lb., though in select flocks it is over 2 lb. The Coimbatore sheep is similar to the Bellary one and has, it is said, a little admixture of Persian blood. Its colour is white with black or brown head. Its wool is coarse with an average yield of between 1 and 1½ lb. The Kolar sheep is bred in the Mysore plateau around Kolar and Bangalore. Its colour is white and brown and its wool yield is about 1½ lb. The Madras, the South Indian and the Nellores are among the hairy class. This variety is found all over South India and is covered with short coarse hair of red or brown colour. It is used as mutton and the only other use it is put to is for manuring fields. The Nellores are tall and large-sized and provide good quality mutton. The major supply of mutton to Madras City is from the Nellore sheep.

418. Shearing is carried on once or twice a year. The season for shearing varies in different tracts. Shearing is done haphazardly in the open, without prior washing of the animal. This results in the wool becoming dirty. Demonstration units have been

organized in the Bellary and Coimbatore districts for demonstrating better shearing methods with improved shears, which are sold on a subsidized basis. The wool obtained is generally coarse and is utilized for kumbli and carpet manufacture, though prior to the war a fair proportion (between 10 and 20 per cent) of the production was exported to foreign countries along with tannery wool. The " kumbli " industry consumes about 1·8 million lb. of wool and carpet manufacture about 0·67 million lb.

Sheep are generally owned by poor people of the 'Kuruba' or the shepherd community who depend on them for their livelihood. The flocks are small and vary from 25 to 50 and occasionally 100 sheep on an average. There are also a few large combined flocks of about 2,000 sheep each. The shepherds are ignorant and conservative and their operations are carried on in the usual traditional manner. They pay very little attention to the selection of their breeding rams. Young rams in the flock are allowed to serve the ewes. There is no regular breeding season; the rams run with the ewes throughout the year and breeding goes on continuously. Traditional methods of management are generally followed with no attempt at housing the flocks even during inclement weather. The animals subsist on what little grazing is available in and around villages. Sheep are penned on cultivable lands during nights for manurial purposes. This system is widely prevalent in the districts having large numbers of sheep.

419. Steps have been taken from the East India Company days for the improvement in the quality and quantity of the wool of the Indian sheep. Cross-breeding with imported rams like Merinos and English breeds was carried out in Bengal and in the United Provinces. The experiments were useful to the extent that the Merinos were in general found to be better suited than the mutton sheep of England for crossing with Indian sheep. The results of the experiments for over 50 years have not markedly influenced sheep breeding in the country. This was mostly due to lack of continuity in the experimental work. Another cause was the temptation among breeders to secure immediate results. The change produced by the use of imported superior sires was most pronounced in the half-bred and the early breeders were evidently flattered by the favourable reports on the wool. No attempt was made to verify the extent to which the improvements would be transmitted to the later generations. The Royal Commission on Agriculture reviewed the experiments on cross-breeding attempted in this country and recommended that the main energies of livestock experts should be concentrated on a study of the best Indian types and that the building up of a ewe flock with definite characteristics should be aimed at before any modification of these characteristics by crossing was decided upon. Efforts to improve the sheep industry in the Madras Province are directed along two lines, firstly, to raise a better stock capable of yielding more mutton out of the hairy type of sheep, and secondly to improve the

quality and quantity of wool from the woolly variety. Two centres have been chosen, one in the Salem district and the other in the Kistna district. The Metcheri sheep in the Salem district is graded up with Mandya rams and the Mailavaram sheep in the Kistna district with Nellore rams. To improve the woolly type, Bikanir rams, famous for their high quality carpet wool, were purchased and distributed in suitable areas so as to improve both the quantity and quality of the local production, but many of them have not survived the changed environment. The opening of a central sheep farm in the Ceded Districts where Bikanir sheep could be bred and brought up so as to allow them to get acclimatized to South Indian conditions before distribution is well under way. Experiments on selective breeding among Bellary sheep and in the grading up of Bellary sheep with Bikanir rams are being carried out at the Hosur Livestock Research Station. A large number of sheep farms should be opened in convenient areas of the Province to take up the following items of work :—

(1) Selective breeding amongst indigenous sheep so as to bring out their inherent quality;

(2) grading up of local sheep with rams of other suitable Indian breeds; and

(3) running flocks of pure-bred sheep of other Indian breeds to get them acclimatized to conditions in the Madras Province.

There should also be established a well-equipped wool research laboratory and wool utilization centres in convenient places to demonstrate methods of utilization of good wool. To produce mass improvement, subsidizing of flocks by the Government will be necessary.

Hand-pounding of rice

420. Pounding of rice by hand is a subsidiary occupation which has been practised in India from time immemorial. It is a useful subsidiary occupation for the rural people to supplement their agricultural income. Until the advent of the rice mills in the beginning of the twentieth century, the industry was widespread and all people, rich and poor, were consuming hand-pounded rice only. After the setting up of rice mills, and their extension to villages, hand-pounding of rice has disappeared from most parts of the Province. It is estimated that while the percentage of the rice-eating population using hand-pounded rice is 85 in Assam, 75 in Bengal, 90 in Bihar, 70 in Hyderabad, 80 in Orissa, it is only 30 in Madras. Seventy per cent of the rice-eating population in this Province thus consume machine-milled rice. Milled rice has spread in both rural and urban areas. It is only in a few remote rural areas that the consumption of hand-pounded rice remains a general custom. Some districts like South Kanara, still prefer hand-pounded rice to milled rice. More recently, however, and especially in the urban areas, there is a growing appreciation of it by the public on account of research on the nutritive value and the vitamin content of hand-pounded rice. The

milling of raw rice very seriously reduces the nutritive value of the grain by depriving the grain of its outer layers (the germ and pericarp). These contain more protein, mineral salts and vitamins than the starchy inner parts of the grain (endosperm). Experts in nutrition research have declared that the loss of Vitamin B1, the anti-beriberi vitamin, produces serious consequences on the health of the people.

421. To pound about 2½ lb. of paddy, between three and four hundred strokes of the pounder, which weighs 6 pounds or thereabouts, are required. Ten minutes pounding will produce, from this quantity of paddy, about 1½ lb. of rice ready for consumption. Allowing the time occupied in winnowing, we may reckon that two women can in one hour pound enough rice for the daily requirements of an average family. The average villager has plenty of leisure for the task; it is not unlikely that the time which village women used to spend in pounding rice is now spent in doing nothing. But the alternative, i.e., to take the paddy to the mill which can carry out the equivalent of several hours hand labour in a few minutes may involve no labour at all. In certain areas, the mill owners collect the paddy in their own carts and mill it for a small charge. A frequent arrangement is that the paddy is milled for nothing on condition that the miller keeps the bran. Such a transaction appeals to the villager who is nevertheless depriving himself of fuel (the husk) and food elements of high nutritive value. To pound rice by hand, a couple of pounders, each costing about Re. 1–4–0, a seive costing about 4 annas and a stone with a semi-circular cavity at the centre planted in the ground, are required. The appliances can be made locally. The Agriculture department has evolved a wooden "hand huller," which consists of two grooved wooden drums in contact with each other, the upper drum being rotated by hand. Paddy placed between the drums is shelled, but the outer layers of the grain are not removed, so that the resulting rice is of high nutritive value. The hand huller costs only Rs. 6 to Rs. 10. It is exhibited at the depots of the department at the headquarters of every taluk. It is calculated that the average cost of hand-pounding 100 lb. of paddy is Re. 0–5–6 and that a person can pound about 2½ pounds of paddy in 10 minutes. In other words, 100 lb. of paddy can be pounded in 400 minutes or 6 hours and 40 minutes realizing an income of Re. 0-5-6. This calculation was made in 1940. Under the present economic conditions created by the war, the income from pounding 100 lb. may be estimated at eight to nine annas.

There are nine co-operative societies for production of hand-pounded rice in the Province. These types of societies generally require a paid clerk to attend to the maintenance of their accounts as the members are mostly illiterate and cannot attend to the affairs of the societies themselves. But they cannot afford this expenditure in the initial stages and some subsidy will be necessary to them towards meeting this expenditure. There are

possibilities of introducing and developing the industry by the organization of co-operative societies for the workers not only for the employment, which it would provide, but also in the interest of the health of the people. The people should, however, be educated about the food value of hand-pounded rice and a growing demand for it should be created. The Government have made the use of hand-pounded rice compulsory in jails and hospitals, with the object of improving diet and creating employment.

Rice husking

422. Of the factory industries, the most important and best established, so far as Madras is concerned, are the rice mills. The number of rice mills, small and large, totals 3,529; of this, 2,332 are situated in rural areas and 1,197 in urban areas. Complete data regarding the number of rice mills in India are not available but the total number of mills is estimated around 10,000. As a premier rice-producing Province, Madras owns one-third of the total rice mills in India. Within the Madras Province, Tanjore has the largest number of mills, namely, 733 or 21 per cent of the total number of mills in the Province. Next in the order of importance are the North Arcot, South Arcot, Trichinopoly, Madura and West Godavari districts, which have from 200 to 300 mills each. But the districts that have the largest number of mills are by no means the largest centres for milling judged by the annual turnover. The average daily capacity of the mills is 2,380 tons in Kistna, 2,220 tons in East Godavari, 1,600 tons in West Godavari, 1,450 tons in Guntur, 1,190 tons in Coimbatore and about 1,000 tons in Vizagapatam. All other districts have a capacity ranging from 200 tons to 500 tons, except Malabar, Chingleput, Trichinopoly and South Arcot, where the capacity is between 600 tons to 900 tons. As a result, the largest quantities of rice milled are in West Godavari and Kistna (320,000 tons), followed by Tanjore (275,000 tons) and East Godavari and Chingleput (210,000 tons). Relatively large quantities ranging from 150,000 tons to 170,000 tons annually are accounted for by mills in Coimbatore, Vizagapatam, Guntur, North Arcot and South Arcot. Milling is practically negligible in the Ceded Districts. In South Kanara, there is very little milling of rice in mills, and the total number of rice mills in that district is only eight. This is a very peculiar position. The area under paddy in South Kanara is around 6 lakhs of acres with an annual production of 3½ lakhs of tons of paddy and the district ranks within the first ten of the Province for rice production. The absence of rice mills is due to the popularity of hand-pounding in that district, hand-pounding being an important subsidiary occupation for the cultivators in the villages. The landlord generally stipulates the lease in so many murras of rice and not as paddy as is common in other districts. So the ryot's obligation includes also hand-pounding, which is, therefore, an organized rural industry. The conditions

in Malabar are almost the same, though there are a few mills in the southern parts of that district.

423. From the actual turnover, it is seen that large mills preponderate in the Circars. In the southern districts, although the number of mills is large in some districts, their capacity is small. They are mostly of the huller-*cum*-sheller type, while the automatic self-contained plants are more prevalent in the Circars. Though the number of mills in the Province is large, the actual number of mills to which the Factories Act applies (those employing on an average 20 persons and above daily) was only 533 in 1942. In the large producing districts, there are more mills in rural areas than in towns, the reverse being the case in deficit districts like Coimbatore and Vizagapatam. Generally, mills are situated in areas served by the railway or within short distances of railway stations. As regards the extent to which the rice milling industry is able to provide employment to ryots as a subsidiary occupation, the number of labourers employed in the 533 larger mills coming under the purview of the Factories Act totalled 18,436 in 1942. Taking the average as 10 per smaller mill, the total number of labourers employed in the remaining 3,000 mills will be around 30,000. The total number of labourers employed is thus 48,436 or about 50,000 in all the rice mills of the Province.

424. The description of the various rural industries given in the preceding paragraphs brings out certain salient features :—

(*a*) Rural industries have a definite place in the economy of the country, and while individually they may be small units, collectively they create wealth and employment to an extent sufficient to transform the life of the villager from one of want to one of sufficiency.

(*b*) Certain rural industries like poultry, bee-keeping, hand-spinning and lace-making can be taken up by any family, and a useful addition to the family income created.

(*c*) Certain other industries like carpet weaving, carpentry, brass vessels manufacture, handloom weaving, glass bangles manufacture should be treated as whole-time occupations and fostered as such.

(*d*) A third class of industries admit of dovetailing small scale into a large-scale manufacture. Preparation of tobacco, crucibles, ceramics and the like will fall into this category.

(*e*) Practically all the rural industries suffer from two major disadvantages—inadequate financing and the grip of a middleman financier-*cum*-trader. The co-operative organization is ideally suited to the needs of rural industries both on the financing and on the marketing sides, and a special officer in that department to develop these industries is necessary.

(*f*) State subsidy for capital equipment and administration is necessary for all of them in the early stages.

(*g*) Technical knowledge is sadly lacking in practically all cases, and this has to be provided.

Above all, a proper perspective towards these industries requires to be developed. At present there are enthusiasts whose judgment is affected by ill-defined visions of a glorious past when machines had not been invented to destroy the soul of man. Such persons have, by political suffering and an accumulated distrust of Western machines, come to delude themselves into the belief that all large-scale production is pernicious and that we should hearken back to a rural civilization, with cottage industries supplementing agriculture. There are others who fail to see that a complete life involves full employment to the villager, a reasonable measure of self-reliance and self-sufficiency for him, and that a mixed farming economy in which the individual farmer and his family use their spare time to fulfil their wants and increase their income will ultimately create a wholesome rural economy. The development of rural industries will also reduce dependence on land. A balance has to be struck between these two points of view, if the proper place of rural industries is to be adequately envisaged.

CHAPTER IX—MARKETING

Introductory

425. The total value of the agricultural produce annually marketed in the Province has been estimated at Rs. 210 crores at current prices. Till recently, the marketing of agricultural produce did not receive sufficient attention in proportion to its magnitude. This was due mainly to the fact that the problem of marketing was considered to be outside the purview of both the Agricultural and the Co-operative departments of the Government. Until the marketing section was inaugurated in 1934, the Agricultural department was not in a position to help the ryot to secure the best possible price for his produce. Similarly, the Co-operative department was preoccupied with organizing credit and did not concern itself with co-operative marketing for a long time. Before the first world war, hardly any country, with the exception of the United States, appreciated the need for the efficient marketing of agricultural produce. Marketing includes a number of functions and processes before ultimate consumption and a marketing study involves the study of all the stages through which the produce moves from the threshing-floor or the farm of the producer until it reaches the consumer. Marketing methods and functions have considerably improved during the last 25 years as a result of improved transport, better standards of living, progressive urbanization, increased production of commercial crops and specialization in commerce.

426. The common practice in ancient days, with a predominantly self-sufficient village economy, was for the grower to barter his surplus goods for the goods and services required by him. Gradually marketing became more and more organized with the improvement in transport services. Commodities began to move from surplus to deficit areas. Merchants, to render the service of buying at some places and selling at others, came into existence. Gradually trading centres arose and these in turn became urbanized. Marketing functions became specialized. Assembling of commodities in central markets came about. Simultaneously progressive science ushered in the machine age. Industries depending on agricultural raw materials like cotton and oil-seeds were started. These were converted into consumer goods. The ryot who started as a subsistence farmer found opportunities to increase his income from the land by substituting commercial crops for foodcrops. Increase in commercial crops and their large turnover led to the erection of produce exchanges. Thus the process of marketing has evolved from a simple system of barter to the complicated machine that we see to-day.

The position of the middleman

427. The economy under which the ryot sold directly to the consumer has thus passed into the background of history. Modern marketing is seen to involve a series of middlemen between the producer and the consumer. There is a tendency in certain quarters to minimize the value of the middlemen. [1] The Royal Commission on Agriculture in India in 1928, had much to say on the point and expressed the opinion "that the aim of better marketing is not necessarily to displace any unit (meaning middleman) in the existing machine but to enable that machine to function to greater advantage." In a modern marketing organization, the middlemen perform certain essential functions. A ryot cannot study or know the marketing organization and conditions, and the part that supply and demand play in the fixation of prices. The volume of produce which a ryot has to sell is so small that his marketing costs are bound to be high if he elects to sell it himself. Assembling and distribution of produce are specialized functions requiring considerable skill and experience and this is the qualification of a middleman who has spent his lifetime in the business. Public opinion is often suspicious of the middleman. This is partly because of the public belief that the middleman carries no risks and is sure of his margin of profit whether the ryot suffers or not. This is partly true as distributors are tolerably secure in the enjoyment of their profit margins, rises in cost being passed on to the consumers. In fairness to the middleman however it must be said that there are marketing risks which he does bear. Division of labour also makes the middleman under modern marketing conditions, a convenience to both buyer and seller. Often he evens out maladjustments in production or consumption. This is especially so in regard to agricultural produce which is produced seasonally, but is consumed throughout the year. This evening out of the supply in relation to demand is a function of considerable significance. In doing this, he assumes risks. He extends credit. He performs the sales service. Therefore what the consumer pays for is the goods plus the services and the high price of the convenience.

428. This does not mean that the system of middlemen organization is perfect at present. It is accepted on all sides that the present methods of marketing agricultural produce are unsatisfactory and in urgent need of reform and organization. The marketing surveys conducted by the special marketing staff have revealed excessive disparity between the price paid to the producer and that paid by the consumer. In other words, while it may be accepted that the convenience of a middleman is necessary, the cost of this convenience should not be such as to make the consumer pay too much and the producer get too little. Generally there are too many functionless middlemen and they take an

[1] Royal Commission on Agriculture in India, 1928, page 383.

excessive share of the profits from sales. This is partly attributable to factors beyond the control of the merchant, as for example, inadequate means of transport, lack of standardization of produce and the extreme individualism of the producer. Instances are also numerous to show that the practices of the middlemen are ruthless and show a full exercise of their bargaining power.

429. Just what share of the consumers' rupee goes to the ryot and how much to the midleman is shown in the series of interesting studies that have been made by the Provincial Marketing staff in their marketing surveys on the spread of the consumer's rupee. A few are extracted below :—

Export as rice from assembling and milling centre to consuming market

[1] The course of "Molagulakulu rice" from Nellore to Coimbatore.

	Per imperial maund. RS.	A.	P.	Per cent.
Cultivator's price for paddy, enough to give one maund of rice, including transport charges to assembling centre.	3	15	2	75·4
Assembling charges borne by seller	0	0	10	1·0
Wholesale price of paddy for above	4	0	0	75·4
Cost of milling	0	2	0	2·4
Miller's or exporter's margin	0	2	9	3·3
Wholesale selling price per maund	4	4	9	82·1
Costs incurred in exporting and assembling market ..	0	2	6	3·8
Railway freight	0	13	0	15·4
Wholesale cost at consuming market	0	1	6	1·8
Wholesale selling price	5	1	9	97.6
Retail margin and cost	0	2	0	2·4
Retailers selling price	5	3	9	100·0

[2] *Price spread of Virginia tobacco as strips to England*

	Per bale of 250 lb. RS.	A.	P.	Percentage.
Average amount realized by grower	85	0	0	51·0
Carting to godown	0	4	0	0·1
Brokerage	1	0	0	0.6
Grading charges	2	4	0	1·4
Stripping charges	2	8	0	1·5
Loss in weight by stripping	17	0	0	10·2
Loss of moisture or bad leaves	8	8	0	5·1
Pressing charges	0	4	0	0·2
Cost of package and packing	3	0	0	1·8
Transport to Cocanada	0	10	0	0·4
Forwarding agent	0	6	0	0·2
Insurance	1	0	0	0·6
Steamer charges	6	4	0	3·7
Cable expenses	0	3	0	0·1
Landing, rent and interests in England	11	10	0	7·0
Brokerage in England	8	5	0	5·0
Margin to exporter	18	14	0	11·3
Total ..	167	0	0	100·0

[1] Report of the Committee on Co-operation in Madras, 19?9–40, page 247.
[2] Report on the Marketing of Tobacco in the Madras Presidency, 1941, page 247.

Groundnut

[1] Price spreads from producer to consumer in the marketing of groundnut kernels

Producer at Salem to Cuddalore exporter.	Per imperial maund. RS. A. P.	Percentage
Producer's price for 1 maund of nuts in shell at his holdings.	2 14 0	75·7
Handling and cartage charges from village to assembling centre.	0 0 9	..
Producer's price at assembling centre	2 14 9	77·0
Charges paid by seller at assembling centre	0 2 0	..
Cost at assembling centre	3 0 9	80·2
Decortication charges	0 1 6	..
Cost of 28 seers kernels	3 2 3	82·7
Bagging, handling, tax and cartage from godown, exporter's agency or decorticating factory to railway station.	0 3 8	..
Agency commission	0 0 3	..
Cost F.O.R. railway station at assembling centre ..	3 6 11	92·0
Railway freight on 28 seers kernels	0 5 1	..
Cost F.O.R. railway station at destination	3 12 0	98·8
Handling and transport charges from railway station to consumer's or exporter's or commission agent's godown.	0 0 9	..
Exporter's cost price	3 12 9	100·0
Consumer's price	5 6 10	..

The need is therefore to build up an efficient marketing system, eliminating functionless middlemen and intermediaries thus benefiting both the producer and consumer. The line of progress is to "institutionalize" the middlemen, generally by co-operative organizations.

Traditional places of marketing

430. Agricultural produce is sold in weekly shandies or markets and in fairs and festivals which are generally rural, and in "mandies," which are urban

Markets and fairs

431. The "shandies" are of ancient origin and are a social concomitant of the village system, wherever there was need for the exchange of surplus commodities. These places of exchange became gradually fixed and people gathered in the same place for buying and selling. These village shandies helped a good deal in the sale of village produce and to-day the village weekly markets are places of brisk trade where business of all kinds is transacted. They perform the dual functions of helping the ryot to buy his needs and of enabling him to dispose of his surplus.

There are 1,788 licensed markets in the Province, of which 1,117 are public markets licensed by local boards and 466 are private markets; 205 markets are maintained by municipalities. The largest number of markets is found in the Coimbatore district

[1] Report on the Marketing of Groundnuts in India and Burma, 1941 pages 380 and 381.

where there are 155, followed next by Malabar with 140 and Salem with 112; Guntur and Nellore have the smallest number of markets, viz., 6 each.

432. A "fair" is a periodical market generally held once a year, and is usually associated with religious festivals. These fairs last from one to two weeks. There are 113 such fairs held in the Province, mostly in the months of February, March and April which coincide with the period after the agricultural harvests. The number of people attending these fairs is very large. The Hampi Car Festival in the Bellary district attracts a crowd of over a lakh and many other important festivals are attended by equally big crowds. These fairs deal in almost all commodities required by the village ryot. The trade in livestock attached to these fairs requires special mention. There are some very large cattle-fairs like Kizhir fair in Malabar where the number of animals assembling is estimated at over 30,000 and the Sivalaparai fair in Tinnevelly where over 25,000 animals are assembled.

Though a substantial volume of trade in agricultural commodities passes through these weekly shandies and annual fairs, there is little or no control exercised by any authority on the transactions or the trade practices. The only control exercised is the levy of market charges relevant to the use of the market place, as for example, the charges on carts or head-loads of commodities or livestock brought for sale. Considering the importance of these weekly markets in the economy of rural life, the first step to be taken for improvement of rural marketing is the control of these village markets in districts where they are found in large numbers as in Coimbatore, Salem, Malabar, Trichinopoly and Madura. The malpractices prevalent in these markets, especially in the handling of commercial crops are unlimited and any control undertaken will go a long way in bettering village marketing conditions.

The mandies

433. The more important centres for marketing of agricultural produce are known as the "Mandies" which are the wholesale markets in South India and operate in all important urban areas. The total number of "mandies" in the Province is 237, two or more mandies in the same locality being taken as one. Of these, there are 22 in the Vizagapatam district, followed next by Coimbatore and Malabar with 19 and 18 respectively. Madura (3) and Nilgiris (1) have the smallest number. These mandies deal in all kinds of commodities and are trade centres for import and export of goods. From the point of view of layout they may be centralized or decentralized. As an example of a centralized market may be mentioned the "Leigh" Bazaar in Salem where all shops are built alike in a central place. The Anakapalle market is also a centralized mandi where godowns exist round a large open place. However, markets or

mandies in urban areas are generally decentralized according to commodities, as in Madras, where rice and pulses are dealt with in port godowns, hides and skins in Periamet, fruits in Bunder street, onions and chillies in Kotwal Bazaar. A general feature in all mandies in the Province is the insufficient space for the handling of goods. A list of principal commodities and the markets in which they are handled is given in Appendix 24.

Produce exchanges

434. A comparatively modern development is the institution of produce exchanges dealing in "futures." Their main function is to register members' transactions and act as a clearing house for the adjustment of claims and liabilities on account of future transactions. Produce exchanges are conspicuously absent in the Madras Province, though there is ample need and scope for them. The facilities offered by the Bombay Exchange for trading in Madras cottons are meagre and very often producers, traders and mill owners are unable to "hedge" their stocks during times of steep fall in prices. There is some scope also for the development of "futures" market for rice and groundnut.

Improvements in marketing

Marketing survey staff

435. [1] The collection and study of exact information on marketing questions must necessarily precede the formulation of an effective policy for the improvement of marketing. For this purpose, the Royal Commission on Agriculture in India in 1928, recommended that, Provincial departments should at once begin a study of marketing conditions. The Central Banking Enquiry Committee which dealt with marketing as a section of rural finance supported the recommendations of the Agricultural Commission for improving and organizing agricultural marketing. The Provincial Economic Conference held in 1934 discussed the question of marketing and there was general agreement that of all measures for improving economic conditions, an intensive programme of developing marketing facilities for agricultural products offered the best prospects of yielding substantial results. In January 1935, the Government of India announced their scheme for the study of marketing and appointed a central marketing staff attached to the Imperial Council of Agricultural Research. The scheme included a series of marketing surveys with reference to the more important crops and animal husbandry products. The Provincial Governments were also then asked to appoint their own marketing staff and the Government of India undertook to meet the initial cost from Central funds. This beginning, made a decade ago, has

Royal Commission on Agriculture in India, 1928, page 408.
Agricultural Marketing in Northern India by S. A. Husain, page 74.

resulted in the publication of several authoritative reports on the marketing of nearly all agricultural and livestock commodities. These reports contain valuable information which will serve as the basis for the formulation of schemes for the improvement of marketing and also for the control of movement of commodities.

Description of marketing conditions

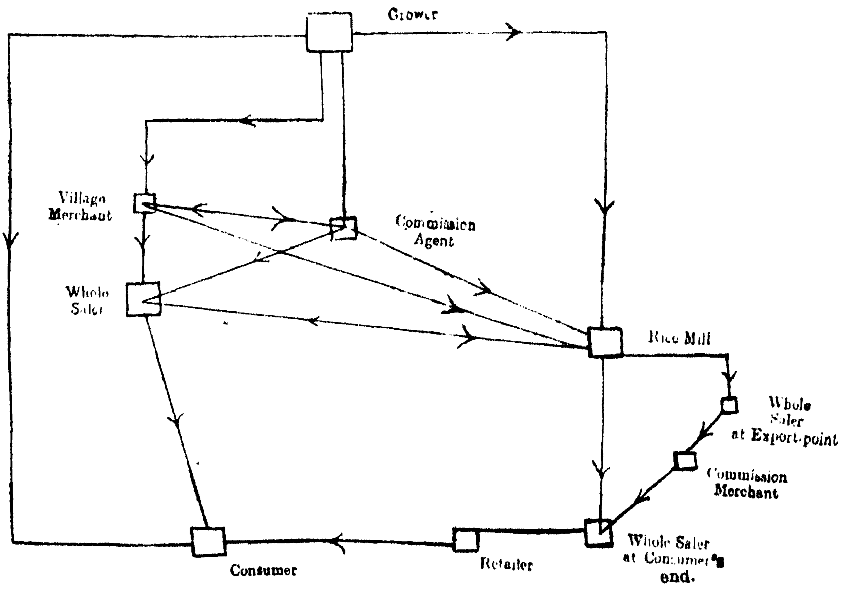
436. The survey reports describe in detail the marketing conditions in respect of each commodity. A short general summary of the results alone is possible here. The first stage in the marketing of any commodity is its *preparation for the market*. Many of the operations connected with this treatment of the produce are important in deciding the price that the commodity will fetch in the market. This treatment may start in the field itself as in the case of tobacco where the crop is carefully harvested by stages with a watchful eye on maturity. The good reputation enjoyed by Nellore rice in all South Indian markets is due to the curing given to the paddy after harvest by keeping the sheaves unthreshed for some months. Full maturity improves the keeping quality of potatoes and enables them to be transported over long distances without perishing. These methods are well known among growers and those who follow them profit by the better prices obtained for their produce. Besides indicating the methods of preparation, the reports reveal many malpractices prevalent during the preparatory stage which have resulted in very low prices. In some cases, these malpractices have also resulted in the total loss of foreign markets. As an instance may be mentioned the practice of damping the produce to gain weight in the cotton and groundnut trades. This practice is also common where parboiled paddy is milled and sold immediately with a high percentage of moisture, particularly in districts where there are small mills and where the milling is done for the local market. The rice if kept for a longer period than a week becomes mouldy and unfit for human consumption. Damping of groundnuts and consequent deterioration in the quality of the exported produce has often been the subject of adverse comment, the main defect complained of being the high percentage of free fatty acids, particularly in shipments from ports south of Madras. Besides damping, adulteration of produce is also commonly practised. In the rice trade it is usual to mix inferior qualities of rice with superior qualities. The rice survey report mentions the common practice of mixing Guntur rices with the Molagulakulu of Nellore. The mixing of old and new rice is another common form of adulteration. The percentage of new rice in old ranges from 10 to 20. The adulteration of groundnut with clay is still in vogue.

Assembling and distribution

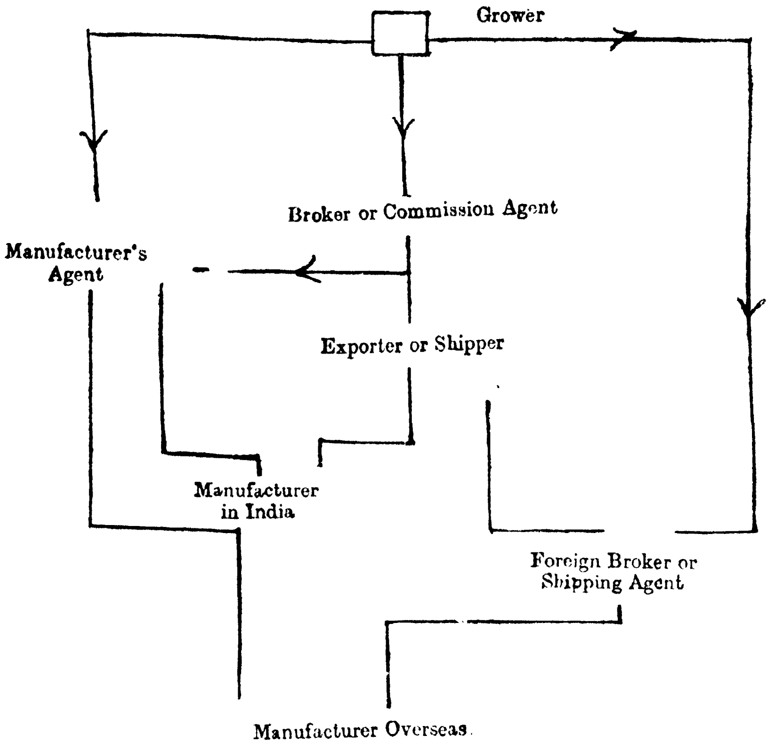
437. Assembling means the pooling of any produce in a central market and includes all movements from the time it leaves the

farm till it reaches the wholesaler. From the time the produce is prepared for the market to the time it reaches the consumer, the movement varies according to the commodity and local circumstances. In the case of paddy for example, the produce usually passes through the village merchant to the mill or wholesaler in the assembling market; from the mill, the rice passes to the wholesaler in the consuming market and generally to one or more retailers. Between the wholesaler or miller at the producing end and the wholesaler at the consuming end a number of brokers intervene. In the case of groundnuts the route taken is from the grower to the village merchant and then to the decorticator with one or two brokers intervening. The decorticating factory generally deals direct with the exporting firm through their agent. In the case of tobacco the village merchant is generally a broker representing a wholesaler in the consuming market. It is not unusual to find wholesalers personally dealing with producers in the producing markets. In the case of perishable articles like potatoes or mangoes wholesalers in the consuming markets depute their representatives to the assembling centres. In the potato market in Mettupalayam it is usual to find several Bombay, Calcutta and Colombo merchants coming and staying during the potato season from June to December. So too in the case of mangoes produced in Coimbatore, Salem and elsewhere. The routes taken by paddy, cigarette tobacco and groundnut from the producer to the consumer are charted out below:—

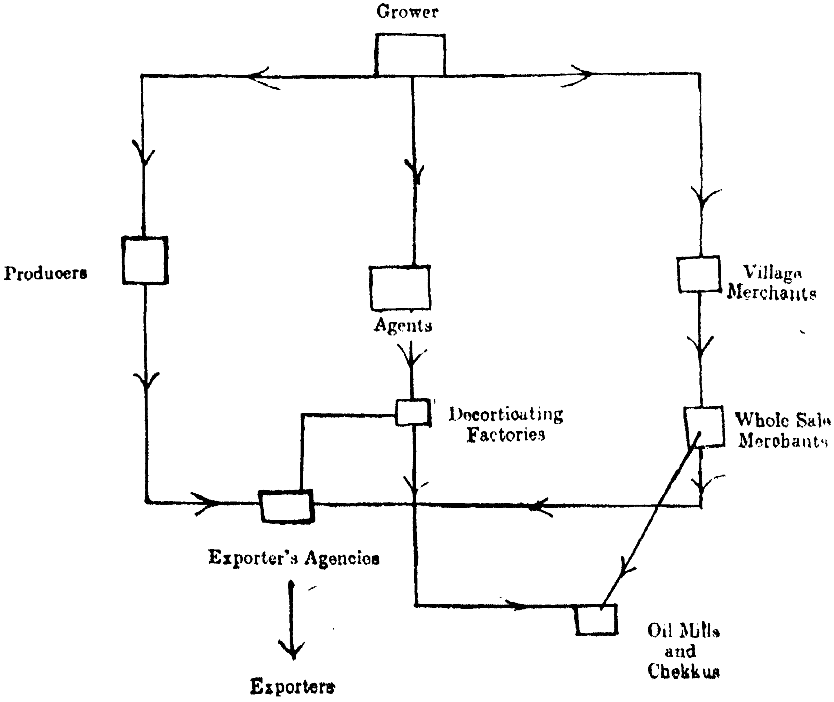
PADDY



CIGARETTE TOBACCO



GROUNDNUT



Marketing finance

438. Finance plays an important part in marketing at this stage. In the Madras Province marketing finance is provided mainly by the following five agencies :—

(1) Commission agents.
(2) Shroffs or indigenous bankers.
(3) Joint stock banks.
(4) Export firms, and
(5) Co-operative societies.

439. The role of commission agents in the marketing of agricultural produce is a very important one. The marketing report on rice states that the largest share of the trade in rice and paddy is in the hands of commission agents. These commission agents perform many functions. Their most important function is financing. Some of them as in Bezwada are merely bankers and rice trade only offers a medium for their business. At other places they finance the movement of crops on commission. Commission agents operate also as shroffs making advances on the value of goods up to 70 or 80 per cent and discount hundies and drafts. Apart from rice, commission agents deal in commodities like pulses, fruits and tobacco. When the village merchant tenders goods for sale, the wholesaler who is generally a commission agent pays him in full before he recovers money from his buyers. Some of the commission agents have running accounts with their up-country suppliers to whom they advance money before the season, as for fruits. They also extend credit to buyers, especially the retailers.

440. Shroffs or indigenous bankers advance money on the pledge of produce. They also discount hundies. Many small members of the trade prefer to deal with them because of their elastic methods, easy accessibility and freedom from formalities insisted on by the bigger banks. Generally the rate of interest is high compared to the bigger banks, but merchants go to them because the indigenous bankers are more helpful in times of crisis. The private bankers have also a more intimate knowledge of their clients. They meet on equal terms socially and come to know of each other's private lives. The bigger banks are not in the same favourable position, as they are bound by certain rules and conventions and have to carry out the orders of their head offices.

441. Most of the joint stock banks in South India finance agricultural produce. Of late, some of the bigger banks of outside registration, e.g., the Central Bank of India have been extensively financing the trade in commercial crops, especially cotton and groundnut. Usually, banks advance 65 to 75 per cent of the value of the produce at varying rates of interest ranging from 4½ to 6 per cent. Withdrawals of stock are allowed against deposit of funds, provided the margin between the value of stock and the loan advanced does not fall below 25 per cent. In cases of fall in prices, the borrower is asked to make good the difference. Conversely the drawing limit is increased, when prices go up. Banks provide also

cash credits to merchants, depending on their financial status. The loans granted by banks are generally of two kinds, namely, open loans and key loans. Open loans are advanced on the personal security of the merchant on declaring that he is in possession of certain goods. Here the personal standing of the merchant counts a great deal and the business is by previous agreement mortgaged to the banks for a definite overdraft on which the merchant operates from time to time. In key loans, the goods are directly mortgaged to the banks in their own godowns or in the merchants' godown itself in which case, the godown key is deposited with the bank.

Export firms

442. Exporters normally provide themselves with funds in India by selling sterling bills of exchange or telegraphic transfers to the exchange banks functioning at the respective port headquarters. Sellers of goods from the interior are financed by hundies. Exporters generally advance 70 to 80 per cent of the value of the goods sold on presentation of railway receipts, the final settlement being made later.

Co-operative marketing societies

443. The co-operative marketing societies advance money to their members at reasonably low rates of interest on the pledge of their stocks. The produce is transported and kept in the societies' own godowns and the sale of the produce is also effected by the society in consultation with the ryot who pledges the stock. The society charges a sale commission of one anna in the rupee on sales effected. Advances range from 50 to 70 per cent of the approximate market value of the produce pledged.

Storage

444. The next important function in the marketing of agricultural produce is storage. The methods of storing vary from place to place. Paddy is stored in pits lined with straw in Vizagapatam and Nellore. " Gadis " are used in the Godavari area. " Dhanyappa Kottulu " which are elaborate wooden boxes are common in the Circars and in Malabar. In Tanjore " Pattarais " are used which are constructions with twisted paddy straw. Fruits are generally kept spread in godowns; so too are potatoes. Commercial crops like cotton and groundnuts are either heaped loose in godowns or bagged in " Borahs " or gunnies. The storage accommodation for agricultural produce in South India is notoriously insufficient. This among other reasons leads to a forced sale earlier and at a cheaper price than necessary. In wholesale markets storage space is confined to godowns attached to mandies. There are very few warehouses in the Province. In Madras City, the Port Trust has provided warehouses for storage of goods in transit

between ship and store. Bonded warehouses also exist for tobacco. Twenty-eight co-operative marketing societies own 37 godowns and forty-nine credit societies have built 52 godowns. The total cost of construction of the godowns was Rs. 5·13 lakhs of which Rs. 1·88 lakhs were advanced as loans by the Government, Rs. 1·17 lakhs were given by the Government as free grant and the balance of Rs. 2·08 lakhs was spent by the societies from their own funds. Godowns have also been constructed in several groundnut centres in South India from the "Groundnut Fund" constituted by the Government of India. These godowns will be entrusted to the groundnut market committees for administration in places where such committees are functioning and in other places to co-operative marketing societies if they are prepared to undertake the responsibility. In the long run the godown facilities to be provided by co-operative marketing societies (which is being considered by the Government of Madras) may have to be supplemented by the establishment of warehouses at important market centres. The idea of establishing warehouses is not new. [1]The Royal Commission on Agriculture said "The future may see in operation in India the type of licensed warehouse conducted for profit within the market premises by private enterprise, independent of both buyer and seller on the lines of the system which exists in the United States of America." [2] The Central Banking Enquiry Committee also suggested the establishment of licensed warehouses, and they included in their report a draft Bill prepared by the late Mr. B. F. Madon. The bill aimed at encouraging the proper storage of agricultural produce, and a uniform system of warehousing with provision for the grant of warehouse receipt generally acceptable to bankers as security for loans on agricultural produce. It also provided for licensing and bonding of public warehouses storing agricultural produce, so that the integrity of warehouse receipts may be beyond question. If such warehouses are established there can be no better or cheaper form of credit for agriculture than that based on warehouse receipts. The Central Banking Enquiry Committee also considered the possibilities of starting railway warehouses at the chief centres of trade and discussed the matter with the Railway Board. The Railway Board wanted to investigate the matter before any definite conclusions could be made committing the Board to this policy. The committee also raised the question of allowing private enterprise to provide and work warehouses on railway land in the vicinity of railway stations. The terms of lease suggested by the Railway Board in this connexion were unacceptable to the committee. With a view to providing sufficient storage accommodation and facilitate financing, it is imperative that the Government should promote the construction of warehouses and enact a Warehouses Act at an early date.

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[1] Report of the Royal Commission on Agriculture in India, 1928, page 395.
[2] Report of the Indian Central Banking Enquiry Committee, 1931, Vol. I, Part I, pages 221–225.

Transport

445. A pre-requisite for successful and efficient marketing is the provision of cheap transport. " Transport " is generally the most expensive item in marketing costs. Marketing surveys reveal that ordinarily 7 to 27 per cent of the consumer's price is due to transport costs. " The cost of transportation does not depend on distance alone, nor does it always vary directly with the distance; the difficulties arising from the distances between the points of supply and demand may be offset by improved communications and cheapened transport. Efficient communications exercise an immediate effect on the factor of time which is an essential element in the " price factor." This principle is well exemplified under present conditions where prices rise considerably in a locality due to shortage of stock arising out of transport difficulties. The Madras Province has a total of 36,670 miles of roads, excluding municipal lanes and streets, of which 25,702 miles are metalled and the rest non-metalled. The total length of railways in the Province is 4,275 miles. The Madras Province has an extensive system of navigable canals with a total length of 1,420 miles. It is accepted on all sides that the transport system of the Province is inadequate for the efficient marketing of agricultural produce. The means of transport generally adopted for agricultural commodities are headloads, pack animals, country carts, motor lorries, railways and small boats. Aerial ropeways also exist in certain hill areas. The following are the comparative average costs of transport by various means of transport exemplified with rice, during the prewar period.

	Pies per maund/ mile.		Pies per maund/ mile.
Country cart ..	.. 0·8 to 1·4	By canals ..	.. 0·16
Lorry ..	.. 1·1 to 1·5	By sea ..	.. 0·03 to 0·06
By rail ..	.. 0·25 to 0·38		

Grading and standardization

446. Considerable inconvenience to trade is created due to the lack of grading and standardization of agricultural produce. Grading means the classification of a commodity according to quality. There are many advantages in the grading and standardization of farm products. Grading decreases marketing costs. It encourages futures trading in many products like groundnut, wheat and cotton. There are no rejections and disputes. It builds up confidence regarding quality in the market resulting in better market intelligence and better prices. Market information cannot be understood unless the commodity is standardized and graded. With a view to facilitating the grading of agricultural produce, the Agricultural Produce (Grading and Marketing) Act was enacted in 1937. Under the provisions of the Act grade designations are prescribed for several agricultural commodities, such as, wheat, atta, rice, jaggery, tobacco, potatoes, fruits and also for livestock

products like ghee, butter, eggs, hides and skins. Grade specifications have also been drawn up for all these commodities. The first grading station in the Madras Province was opened in 1938 where grading of sathukudi oranges was commenced. Since then, there has been steady progress.

447. The controls instituted by Government on various commodities as a wartime measure have tended to check the expansion of grading. Though the value of the produce graded annually is negligible in comparison with the total turnover in agricultural commodities, yet, the scheme continues to be a success. Special mention must be made of the success in grading of fruit which has resulted in a better price for the producer ranging from 5 to 10 per cent over market prices. A good demand arose for "Agmarked" Molagulakulu rice throughout the Presidency. Agmarked potatoes were in keen demand in the Bombay market. Agmarked eggs earned such a good reputation for quality that the hospitals in Madras insisted that their contractors should supply only Agmarked eggs. Here again, the main difficulty that checks progress is the suspicious attitude of the trade. Merchants as a class do not like any interference in their trade practices irrespective of whether the innovation is for their good or not. If the interference is from Government quarters it is unwelcome. Another set of merchants have their vested interests in the trade in several commodities with an established reputation for quality. This is commonly prevalent in Nellore rice and Nilgiri potatoes. The introduction of the "Agmark" has enabled all merchants to come up to a particular known and accepted standard and get an equal share of the trade. This is generally resented by dealers in old established brands whose margin of profits is affected.

448. Experience of grading has indicated that it stabilizes trade and fetches a better price to the producer; but, for grading to become a success, it is essential to introduce an element of compulsion in the interests of all as has been done now in the case of cigarette tobacco for export, where it is necessary to Agmark all tobacco according to Government grade specifications. In the United Provinces, all ghee has to be compulsorily graded before being put into the market. In the United States, grading and standardization has been made compulsory for almost all agricultural commodities to be put on the market. A large number of inspections are arranged under Government auspices at various terminal points and no produce escapes the watchful eye of the inspectors. The trade has become accustomed to the grade standard and specification and dealings are always on the basis of grades, facilitating price discussion and avoiding trade disputes.

Market Intelligence

449. Another subject requiring attention is the dissemination of market intelligence. The chief sources of market intelligence in

urban areas are Government publications, trade papers, newspapers and private information. Recently use has been made of the radio for broadcasting prices relating to some important markets and commodities. Under Government publications may be instanced the weekly weather and crop reports, notes on agricultural conditions and rainfall data published in the weekly *Fort St. George Gazette.* The prices of many important commodities are also published in the same publication. By arrangement with the Government of India, Department of Commercial Intelligence, all Provinces publish forecasts of important crops. These forecasts give information on acreages and estimates of yield. The publication of weekly index prices of important commodities is undertaken by the Department of Civil Supplies. Quotations and brief market reports of important commodities are published in various English and vernacular dailies. Many of these publications, however, are of little use to the ryot as they are not accessible to him. The main source of his market information is the visiting middleman.

Cold storage

450. In this Province, storage facilities are also lacking for cold storage of perishables. Considering the growing importance of dietary articles like fruits and vegetables, dairy and poultry products, it is necessary to give more attention to the cold storage problem in all its aspects. There are a few cold storage concerns in the City of Madras but the cost is too high to the trade at large. It is found paying only in respect of certain special commodities. An investigation of the problem appears to be necessary. In this connexion, the Government are actively considering the opening of a cold storage research station attached to the Fruit Research Laboratories at Kodur. This research station will provide considerable data on the methods of storage of various fruits and perishables under South Indian conditions and thus pave the way for a better and more organized trade in perishables ultimately resulting in better prices to the grower.

Marketing regulation

451. The various heads under which legislation is essential or has been enacted may be classed as under (1) standardization of weights and measures, (2) regulation of marketing charges, (3) penalising of false weighment, and of secret price bargains and (4) regulation of grading and standardization.

Weights and measures

452. One of the many drawbacks in the marketing of agricultural produce is the multiplicity of weights and measures adopted by

the trade. As long ago as 1914 a committee recommended the standardization of weights and measures but its recommendations were not given effect to. [1]Again in 1928, the Royal Commission on Agriculture drew pointed attention to a number of disabilities under which the cultivator laboured owing to the chaotic condition of the weights and measures in general use in this country and the hampering effect it had upon trade and commerce generally, and stated that the time had come for a re-examination of the position.

In Madras, there is great diversity and much confusion with regard to weights and measures used in the various districts. For instance, the "maund" for all India means a weight of 3,200 tolas, but is only 900 tolas in Vizagapatam, 1,000 tolas in Coimbatore and 1,120 tolas in South Kanara. Similarly, a "kuncham", a measure commonly used in the northern districts of the Province varies from 96 fluid ounces to 128 fluid ounces within the same district of Vizagapatam and is 220 fluid ounces in Kistna and 560 fluid ounces in Nellore. There is similar diversity in the "Marakkal" which varies from 96 fluid ounces in North Arcot to 312·3 fluid ounces in Chingleput. The "seer" is 44 ounces in Kistna, 40 ounces in Nellore and 41·7 ounces in Bellary and South Kanara. The most commonly used weight in India is the Imperial Maund of 82·2857 lb. It is freely used in Madras by the Railways and is the basis for price quotations in the *Fort St. George Gazette*. To avoid this confusion the Government of India passed the Standards of Weights Act of 1939, by which standard weights were fixed. According to the Government of India Act, 1935, the establishment of standard weights is the responsibility of the Central Government and it is open to the Provincial Governments to adopt local provincial standards which are either multiples or sub-multiples of the All-India standards. The standardization of measures is a Provincial responsibility. In the Madras Province, however, standard weights and measures have not yet been prescribed.

Regulated markets

453. The earliest attempt to control marketing operations was made in 1897 when the cotton and grain markets law for the "Hyderabad Assigned Districts" was promulgated by the Government of India. This is popularly known as the Berar Regulated Markets. This had a very beneficial effect on the marketing of cotton in that Province. The Royal Commission on Agriculture, in reviewing the work of the Berar Regulated Markets, recommended their extension all over the country. When the Royal Commission was engaged in its enquiries, the Bombay Legislative Council passed the Cotton Markets Act of 1927. The Bombay Act was an improvement over the Berar Act and the defects noticed in the working of

[1] Report of the Royal Commission on Agriculture in India, 1928, page 396.

the Berar Act were either corrected or avoided. In 1932, the Central Provinces Cotton Market Act was approved by the local Legislative Council. The Act was intended to provide for the establishment and better regulation of cotton markets in the Central Provinces proper. Like the Acts of Berar and Bombay, the Central Provinces Act also worked very satisfactorily and according to the Director of Agriculture, Central Provinces, the " grower was able to get a fairer price for his produce than he did before." In Bombay also the regulated markets proved to be of immense benefit to the grower.

454. In Madras, the Commercial Crops Market Act of 1933, as subsequently amended, provides for the better regulation of the buying and selling of commercial crops like cotton, groundnut and tobacco. In the area notified under the Act, no person can set up, establish or continue a business in a notified commodity except under a licence granted by the market committee. The grower who is not a dealer is exempted from this provision. Such licences may be cancelled by the Collector for contravention of any of the provisions of the Act. Provision is made for the constitution of market committees with a maximum of 12 members representing growers, traders, local bodies and those nominated by Government and the period of office of the committee is fixed at three years. The Act also provides for the supersession of the committee by the Government in case of abuse of its powers.

These committees obtain their funds by the levy of fees on the agricultural produce bought or sold within the notified area. There is a special provision in the rules framed under the Act for levying of a subscription for collecting and disseminating information relating to crop statistics or marketing. All the moneys are paid into the market committee fund which is expendable on the various purposes for which the market committee is constituted, such as, the acquisition of sites for the market, maintenance and improvement of the market, construction and repair of buildings, provision and maintenance of standard weights and measures, payment of salaries to employees, payment of expenses incidental to elections, payment of interest on loans and sinking fund that may be raised, the construction of godowns, collection and dissemination of information relating to crop statistics and marketing, extension of cultural improvement of the commercial crop and propaganda in favour of agricultural improvement.

455. The main provision of the Act is that which regulates trade allowances. It is notorious that the allowances and deductions made by the trade in connexion with commercial crops are innumerable and the Act provides that " no trade allowance, other than an allowance prescribed by the rules or by-laws shall be made or received in a notified area in respect of the crop." Penalties in the form of fines have been provided for breach of the Act, rules and by-laws. Six market committees have so far been constituted

under the Act of 1933 for cotton, groundnut and tobacco in the Province as shown below :—

Name of committees and date of formation.	Number of members. Growers.	Traders.	Local bodies.	Nominated.	Total.	Area of operations.
Bezwada Tobacco Market Committee (April 1940).	3	2	1	1	7	Bezwada Taluk. Administered by a Special Officer.
Guntur Tobacco Market Committee (April 1939).	4	3	1	1	9	Whole district.
South Arcot Groundnut Market Committee (April 1939).	4	3	1	1	9	Do.
Tiruppur Cotton Market Committee (January 1936).	4	3	1	1	9	Municipal area and five miles around.
Adoni Cotton Market Committee (November 1939).	4	3	1	1	9	Do.
Nandyal Cotton Market Committee (November 1939).	4	3	1	1	9	Do.

Working of regulated markets in Madras

456. The Act was first applied to cotton in Tiruppur in 1936 and later extended to Adoni and Nandyal in 1939. There was initial opposition from the trade but later the merchants reconciled themselves to the situation and had to work the Act. Effective control of marketing operations is possible only when the market is centralized, so that all the dealers can be kept under the watchful eye of the committee's executives. The Tiruppur market is decentralized, the mandies being scattered all over the area, naturally resulting in ineffective supervision. Though the committee has a yard, transactions in the yard are very few. On the other hand, the Adoni and Nandyal Market Committees have centralized markets.

The Tiruppur Market Committee publishes two market reports daily in English and in Tamil which give particulars of New York, Liverpool and Bombay markets and also of local sales and purchases of cotton, with prices. This has enabled every grower to keep in touch with market conditions and price fluctuations. One has only to go through the district to find every grower well posted about cotton prices, because of the wide publicity given to cotton prices by the market committee. Ten years ago it was the usual custom for some of the privileged merchants to keep the foreign market quotations received by them as a closely guarded secret. The prices and market movements at Bombay, Liverpool and elsewhere were never allowed to leak out, and small dealers and the growers suffered in consequence. They were ignorant of the trend of prices, except from quotations in the newspapers and letters from constituents which naturally took time. At present, these market quotations are no longer a secret of the privileged few. The quotations are available to all those interested in the trade and every literate grower refers to the market bulletins of

the market committee before he sells his produce. This apart, the executives of the committee guide and advice growers about market conditions and future trends and help them to sell when prices are good.

457. Another result of the regulation of markets is the prohibition of several unauthorized trade allowances. Weights and scales are frequently checked by the committee. One thousand five hundred and ninety-six weights were stamped and checked in the Tiruppur market in 1943. Though the co-operation from the trade was rather halting, it has been possible for the Tiruppur Committee to bring about several reforms. The scale allowance of 1 lb., for every weighment for lint and an additional 11 lb., for every 1,000 lb. of kappas, has been completely stopped. Charity of one anna and two annas on a pothi of kappas and candy of lint, respectively, has been declared illegal. Free sample of half pound of lint per borah has to be paid for now. Cart hire which was charged even when delivered to a merchant's godown has been stopped. The rates of brokerage and commission have been reduced. Before the Act came into force the maund was anything between 26 and 28 lb. and this has been fixed at 28 lb. now. Based on the annual turnover, the savings effected to the grower by reductions in brokerage and commission alone exceed 4 lakhs of rupees per annum.

The benefits to the cotton-grower from the Adoni and Nandyal Committees have also been remarkable. Stone weights which were common have been done away with. The committee arranges for a system of opening rates by public auction daily as the market opens, which acts as a basis for the transactions for the day. The Adoni Committee has been able to control the bulk of the trade by a system of auctions held in rotation in different premises. In both these committees regular checks are conducted regarding weights, brokerages and allowances.

The South Arcot Market Committee for groundnut has six market yards at Villupuram, Cuddalore, Vriddhachalam, Tirukkoyilur, Ulundurpet and Tindivanam for the regulation of marketing. The system of sale followed is by closed auction which results in the highest quotation for each lot. The yards are becoming very popular. For the quantity sold in the yards in 1943 increased returns to the grower are estimated at Rs. 1,80,110. Losses due to trade allowances and samples have been reduced. Volume measures are entirely prohibited. The committee adopts the All-India standard contract for groundnuts. 2,384 weights were corrected and stamped during 1943.

458. Regulated markets for tobacco were established in Guntur in 1939. Market yards were constructed at Guntur and Tadikonda and hired in other places. The committee paid attention to the control of transactions. In 1940, the Bezwada market which was only part of the Guntur Committee began to function separately. Its affairs are, however, administered by a special officer in the absence of agreement among members of the committee. Though

useful work has been done, the tobacco markets have not gained in popularity due to considerable opposition from the trade.

In general, the main advantages of these regulated markets have been (1) to define the trade allowances and market charges. Excessive charges are reduced and unauthorized ones are prohibited. (2) Correct weighments are assured by the system of licensing and supervision. The weights are also periodically checked. Disputes arising out of quality differences, and deductions are settled by the committee who act as arbitrators, and litigation is avoided. (3) Market intelligence is collected and disseminated by the committee. (4) Godown space has been or is being provided in all market yards. (5) Agricultural improvements are also assisted.

459. Though the grower has derived several benefits by the introduction of these regulated markets, and the committees themselves have performed useful functions, there is scope for further improvement. As indicated already, the market yards have not been as popular for tobacco as for other crops. In Tiruppur, the market area is confined to the municipal limits and surroundings, and this has led to the diversion of some of the trade to other market centres in the district like Pollachi, Udamalpet and Coimbatore. The extension of the Act to the whole district as in South Arcot would prove more beneficial. Apart from extending the Act to whole district where the need is keenly felt, the principles and provisions of the Act should be applied to all commodities. The regulation of the rice trade under the Act in normal times will prove very beneficial to the growers. Another necessary amendment to the Act is the need to make transactions in the market yard compulsory. At present, the purchase and sale in the yard is only optional and voluntary on the part of the grower or dealer. This encourages diversion of the trade from the market yards, and makes it difficult for the committee to supervise the transactions effectively.

Co-operative marketing

460. The problem of the marketing of agricultural produce on co-operative lines has been tackled by the Co-operative department for the last fifteen years and the history of co-operative marketing is a record of feeble efforts at marketing on a co-operative basis which must be done on a most elaborate plan and with greater determination. The Royal Commission on Agriculture recommended some form of organization to enable the cultivator to secure a full premium for superior quality and added that group marketing would be more efficient than marketing by individuals. It was decided to organize co-operative sale societies, to educate the cultivator in the production and preparation of his produce for the market, to provide a sufficient volume of produce for the purpose of efficient grading and to bring the producers into direct touch with the export market and large consumers in this country. The progress achieved in co-operative marketing is given in Appendix 25. The first attempt at joint sale of produce was made in 1918 when the South Canara Co-operative Society was organized for the joint sale of arecanuts

on behalf of its members. But no further progress was made till 1925 when Deputy Registrars of Co-operative Society were appointed for groups of districts and made responsible for non-credit work. In five years, 73 societies started functioning and their number reached 181 in 1944–45. The objects of sale societies are to advance loans to members on the security of their produce and to arrange for its sale but the latter function has been limited in actual practice. They own or rent godowns for the storage of the produce pledged. They deal in a variety of agricultural produce such as paddy, groundnut, cotton, jaggery, pepper, coconuts and potatoes. The Tiruppur Co-operative Trading Society for cotton, the Tanjore Co-operative Marketing Federation for paddy and rice, the Coimbatore Marketing Society for jaggery, the Malabar District Co-operative Marketing Society for pepper, the Kodur Society for fruits and the Rasipuram Society for groundnut, cotton and ghee, are some outstanding examples of co-operative marketing societies in the Province. The marketing functions of the societies have been affected by the control orders issued under war conditions. In certain cases the orders have helped in the expansion of the work of some societies as in the case of marketing federations in certain districts which have been recognized as agents of Grain Purchase Officers in the purchase of paddy and rice. There are five marketing federations and the Tanjore Federation alone sold paddy and rice worth Rs. 50 lakhs in 1943–44. Another society which was benefited by the control orders is the Nilgiris Co-operative Marketing Society which marketed potatoes worth about Rs. 13·66 lakhs in 1944–45. Fruit growers' societies have also been benefited by war conditions and the Kodur Society handled produce worth nearly Rs. 40 lakhs in the same year.

Controlled credit

461. The recent development in co-operative marketing is the controlled credit system which was introduced in 1936. Under this system, loans are given to members by rural credit societies for cultivation expenses, on the condition that the produce raised with the help of these loans should be delivered to the sale society to which the credit society is affiliated. Care is taken that these loans are given in time to meet the cultivation expenses, and care is also taken to see that the produce raised with these loans is delivered at the sale society. The sale society arranges to dispose of the produce by public auction, or tender, or by private negotiation; but the deal will be knocked down only if the price secured satisfies the producer. Otherwise the produce is held over until prices rise further in the market. To enable the producer to hold over the produce in this manner, the sale society advances money on the pledge of the produce, or when it disposes of the produce, it deducts the cultivation loan advanced by the rural credit society, remits it to the rural credit society and gives only the balance of the sale proceeds to the producer. For the services it renders the sale society

collects a small commission from the producer. This system is intended to get the ryots out of the clutches of money-lenders and middlemen by providing funds both for cultivation and for withholding the produce until prices rise in the market. Experience has shown that the ryot gets a fair price for his produce only if he is a free agent and is at liberty to market his produce where and when he pleases. This is done by linking the primary societies with sale societies. The scheme is now in force in selected areas in 20 districts where commercial crops like groundnut and cotton are largely grown. In all, 67 sale societies and 487 village credit societies issued cultivation loans to the extent of Rs. 6,03,000 during 1944–45.[1]

Working of marketing societies

462. In looking for improvements, the first point to be considered is the trade turnover of the marketing societies. In 1944–45 there were on the whole 181 marketing societies. The progress in the marketing of agricultural produce through sale societies is no doubt fair, but considering the volume of goods handled by private merchants every year, the results achieved in co-operative marketing are still insignificant. What these societies have been able to do is to enable ryots to hold up their produce and get the benefits of a seasonal rise in prices; they are not in a position materially to influence the prices to the advantage of the ryots. If the co-operative marketing of agricultural produce is to be effective enough to benefit the large body of the agricultural classes in the Province it is necessary to have a plan by which the Province is covered by a net work of co-operative marketing organizations. They should be so organized as to undertake all the services as are necessary for effective marketing. The Vijiaraghavacharya Committee on co-operation, 1939–40, recommended the formation of marketing societies at every taluk headquarters. Increase in the number of institutions alone may not help in the work of expansion. The membership of each society should be considerably increased so as to include most of the ryots in the area. The average membership of sale societies now is 419. Efficiency in marketing improves with the quantity handled. Increased turnover is one of the chief ways of securing economies. Well organized societies secure increased bargaining power and when they employ talent, they secure technical skill and more efficiency. Steps should be taken to increase the membership of societies to at least five times the present number. This will naturally result in increased share capital and it is suggested that a sale society should have a share capital of Rs. 50,000 and bigger societies, Rs. 1,00,000. Increased capital will increase the confidence of financing banks and thus increase marketing efficiency. One of the main difficulties that the marketing societies have been facing for some time past is the want of loyalty on the part of members in delivering their produce to the society. This want of loyalty is unfortunately so widespread that societies lead a

[1] Administration Report of the Registrar of Co-operative Societies, 1944–45, pages 15–16.

precarious existence on the good-will of a few of its members. Even in advanced countries where co-operation has made considerable headway some measure of compulsion not to speak of ' local option ' has been found necessary. In countries like Canada, South Africa, Australia and New Zealand " iron clad " contracts have been successfully worked and even Great Britain, the land of *laizzez faire* has in Marketing Acts taken the power to go ahead with a form of compulsory co-operative marketing. A certain measure of compulsion is conducive to progress on right lines. If 70 or 75 per cent of the ryots in an area belong to the society, the question of compelling the rest by law to join it may be investigated. The extension of the controlled credit system will help materially to secure the loyalty of members. Very often the members are not loyal because the financial help given by the society is not adequate to meet all their requirements. They, therefore, go to the village sowcar for supplementing their requirements. Another reason is the low percentage of advances given on the produce tendered for storage. The societies in general give advances only to the extent of 60 to 75 per cent of the market price. There are many commission mandies that advance up to 90 per cent of the market price. Societies must be able to increase their margin of advances. The Committee on Co-operation in Madras 1939–40 has recommended only 70 per cent in the case of food crops and 60 per cent in the case of commercial crops. This appears to be rather low, as the fluctuations in prices are not so wide in normal times as to require 40 per cent margins.

Pooling of produce

463. The Central Banking Enquiry Committee were of the view that pooling is a very important item contributing to the success of the sales organization. Without pooling, societies cannot go beyond the stage of the first or second middleman and cannot permanently overcome the danger of local boycotts. Only if pooling is undertaken can the sale societies aspire to become a potent force in the market. At present the co-operative marketing societies sell the produce in the local market under the same conditions as other merchants. The only difference is in the commission charged which is comparatively low. It is essential in the interest of efficiency that the marketing societies should consider the possibility of pooling their produce and start standardization by grading. This will ultimately lead to better business.

The present aversion of the ryots to the pooling of the produce tendered to the societies is due to their belief that their produce may get mixed up with other and probably cheaper varieties tendered by others. This difficulty can be easily got over by grading the produce as soon as it is delivered to the society's godown. This will enable the society to mix it with other produce of the same grade and to note the quantities under the various grades tendered by each member. Examples are not wanting where societies in spite of facilities for grading produce do not take any interest in the matter. The Nilgiris Co-operative Marketing Society for potatoes was not able

to get very good prices for potatoes consigned to Bombay and Colombo which were the principal consuming markets. The produce tendered by members except in the case of a few large growers, however, never made up a wagon-load. The society's executive could not get the ryots to grade the potatoes to enable it to be pooled. The result was that different members' consignments were made up to make a wagon load in odd lots of so many bags per ryot which were in turn sold at the consuming markets in odd lots to help distribution of the sale proceeds to individual ryots. The members consequently did not get the full benefit of the consignments. The management of the sale societies must be chosen for business ability and must be paid accordingly. The executive must have the ability to create a partnership with the members based on the idea that the management is solely a trustee for the good and welfare of those whose products are sold through the organization.

Co-operative marketing of livestock products

464. Another line in which co-operative marketing has developed during the last decade is in the marketing of milk. The marketing of milk on co-operative lines has progressed to some extent in this Province. The idea of supplying milk on co-operative lines had its origin in the need for an adequate supply of pure milk under sanitary conditions in the cities of the Province. The first co-operative milk supply union was organized in Madras City in 1927. A few societies were formed in the Poonamallee area and the milk was sold to hotels and clubs. In the early stages of the organization it was an uphill task and the societies suffered losses by supplying to hotels which were very irregular in their payments for the milk supplied. The societies then turned their attention to the supply of milk to the general public but here again transport difficulties had to be faced in respect of early morning supplies. The Government came to their rescue by giving a lorry to all the societies together who had by then formed into "The Madras Co-operative Milk Supply Union, Ltd." The union has since expanded considerably and it is estimated now that about 20 per cent of the milk supply to the city is made by the Madras Milk Supply Union. The society owns a pasteurising plant and milk is pasteurised and distributed through 43 of its sale depots situated all over the city. The milk supply unions, apart from supplying pure wholesome milk to consumers at a reasonable price, advance loans to members through primary societies for the purchase of milch cattle and fodder. They purchase cattle food at wholesale rates and distribute it to their members. With a view to improving the progeny of milch cattle, Scindhi breeding bulls or Delhi buffaloes are stationed at Government Veterinary institutions in places where there are big co-operative milk supply societies or unions, and the animals belonging to their organizations are entitled to free service of the bulls or buffaloes. Members of milk supply societies are permitted freely to remove grass from forests and undergrassed areas for ensilaging. Including the Madras Co-operative Milk Supply

Union, there were in the Province 19 co-operative milk supply unions and 191 milk supply societies during 1944–45. There are milk supply unions at Salem, Coimbatore, Calicut, Madura and many other important cities. These unions also supply milk to state hospitals and other public institutions like college hostels. Where unions have not been constituted with supply societies affiliated to them, the societies supply milk direct to consumers.

[1] The following statement gives the progress achieved by these unions :—

Year.	Sales of milk.	Year.	Sales of milk.
	RUPEES IN LAKHS.		RUPEES IN LAKHS.
1941–42	7·87	1943–44	12·24
1942–43	8·64	1944–45	32·69

There are some societies dealing in butter and ghee but their number is negligible. Steps should be taken to organize ghee societies in compact areas where sufficient quantities are available.

It is possible that if the milk supply unions progress with Government help, they may before long become monopolistic suppliers of milk in big cities. The responsibilities attached to such organizations are very great as they supply a vital need. There is a tendency in some of the mufassal milk supply unions to overlook this vital aspect of the problem. As an instance in point it may be mentioned that few of the milk supply unions have steam boilers to sterilize their milk utensils.

Linking of producers sale societies with consumer stores

465. Efforts are being made to link up producer's societies with consumer's societies wherever possible. Recently marketing federations have been started in districts like Tanjore and Nellore, with a view to purchasing agricultural produce from loan and sale societies and distributing it to the public through consumer stores. The advantages of this linking are indicated in the sub-joined table illustrating the distribution of 100 sathukudi oranges from Kodur :—

Particulars.	Through middle-men.				Through co-operative societies.			
	RS.	A.	P.	PER CENT.	RS.	A.	P.	PER CENT.
Price paid by consumer	6	8	0	100	6	8	0	100
Retailer's margin	0	13	6	13·1	0	14	0	14·2
Cost of retailing	0	5	3	5·0	0	14	6	13·9
Market charges payable by retailers.	0	5	3	5·0	..			..
Handling and marketing charges at Madras payable by seller	0	6	9	6·5	0	1	9	1·7
Railway freight	0	5	0	4·8	0	5	0	4·8
Handling and marketing charges at Kodur	0	12	3	11·8	0	2	9	2·7
Price received by grower	3	8	0	53·8	4	1	3	62·7

The producer realizes 8·9 per cent more by selling his oranges through the society while the retailer's margin of 14·2 per cent goes to the consumers' store which is ultimately passed on to members. There is a great future for the linking up of these two types of organizations.

[1] Administration Reports of the Registrar of Co-operative Societies, 1941–42 to 1944–45.

CHAPTER X—REGULATION OF PRICES FOR AGRICULTURAL PRODUCE

Introductory

466. The need for guaranteeing a fair price to the agriculturist has by now received adequate recognition. The Policy Committee on Agriculture has recommended that "Government should guarantee to producers an assured market at a remunerative price for agricultural produce." As agriculture is the chief industry of India, it is the prosperity of the agriculturists that will for a considerable time to come sustain the increasing exploitation of available resources and the consequent expansion of production on all sides; in other words, the importance of agriculture is not merely that it supplies a vital necessity of life; it is also that in the interplay of supply and demand the availability of a fair margin over costs to the largest section of the population is the most satisfactory means of ensuring a steady market all round.

American and Japanese experiments

467. Regulation of agricultural output and prices has hitherto been attempted notably in America and Japan. In India certain measures of control were introduced during the last war including partial price regulation. The controls now being worked in this country are, however, more elaborate. The steps taken in the United States of America were the result of certain deep seated maladjustments which culminated in the financial crash of 1929. Before the last war American agriculture stood in a satisfactory relationship to its markets, both foreign and domestic. Agricultural prices rose more than other prices, and farm earnings and farm valuations increased. The war drew the United States of America into heavy production for export, while saddling the importing countries with debts and political troubles which reduced their buying power. Tariffs excluded foreign goods which the United States of America might have received in payment for its agricultural exports. Loans furnished their foreign customers with an undependable means of payment which ultimately failed. The crisis of 1929 developed largely as a consequence of these inconsistencies, though monetary difficulties in many countries played a considerable part therein. As their buying power declined other countries adopted trade restrictions which added to the difficulties of the United States of America. As a result the demand for the products of the farm dropped while production remained virtually unchanged as farmers could not easily adjust production to demand. The depression in industries led to a reduction of the domestic demand also. Stocks piled up and prices fell. While this disparity between costs and prices started off the depression, the

restrictions in credit aggravated it. It is to combat this situation that the Agricultural Adjustment Act was passed in 1933. The purpose of the Act was to establish such a balance between the production and the consumption of agricultural commodities as would restore the purchasing power of farm products to the level of a base period when normal conditions prevailed. It provided for the adjustment of supply to demand by planning of production as well as by the grant of subsidies to those who curtailed cultivation, for the elimination of competitive wastes by marketing agreements, for refinancing agriculture by scaling down debts and regulating prices. By 1935 the end of the period of emergency adjustments and of drastic reductions in farm output had come into view and questions relating to "balanced expansion" from a long range view came to be considered. In 1936 the Act was repealed by the Federal Court but by then the depression had lifted.

468. The Japanese system of control owes its origin to the war-time measures adopted to deal with the abnormal food situation which arose in Japan during the last Great War. The Japanese Government decided to incorporate the ideas underlying these war-time experiments as part of peace time economic policy and a series of Rice Laws were passed. The main principles of the Japanese system of control are :—

(1) The Government must not allow prices to fall below a prescribed minimum or rise above a prescribed maximum.

(2) The minimum and maximum figures were to be calculated by reference to cost of cultivation, cost of living, and general trend of prices, on the principle of the ratio of the index number of the price of rice to the index number of the prices of commodities in general.

(3) In order to maintain this minimum and maximum price, Government would accept offers for purchase at the maximum price or for sale at the minimum price any quantity of rice.

(4) Imports or exports on private account, except through licences are prohibited.

(5) Rice control associations are set up to allot quotas to members, offer storage facilities, issue warehouse certificates and deliver rice to the Government under prescribed conditions.

Control measures adopted in India during the last War

469. The conditions described below primarily relate to this Province but with an all-India background. Till the later years of the last war, there was very little control either of agricultural production or prices in this country. Definite anxiety was felt towards the end of 1917. The difficulties were felt about distribution rather than supply as lack of shipping had thrown on the railways a heavy burden of what in normal times had been sea-borne traffic. The Government of India suggested the appointment of a Director of Traffic in each Province to suggest measures for the conservation of rolling stock and its more economical utilization and to

regulate the internal movement of foodstuffs and other necessaries. This was followed by the appointment in each Province of a Director of Civil Supplies whose duties were to consider the stocks of foodstuffs and other necessaries of life in the Province, to receive and examine applications from merchants and others for the movement of traffic, to scrutinize reports and demands sent to him by Collectors and to issue priority certificates for the transport of goods. In 1918 the Government of India appointed a Foodstuffs Commissioner who was to be a single executive authority working under the Government of India to co-ordinate the activities of the Provincial Directors. A census of the stock available was prescribed. The question of prices was regarded as of secondary importance. Where it appeared that stocks were improperly held up, it was open to the District Officers to apply to the Government to take possession of such stocks on payment of compensation. There was no rationing of supplies to consumers. Side by side with these steps various measures were adopted to increase the production of foodstuffs. Reciprocal arrangements were made for the exchange of foodgrains between other Provinces and neighbouring States. A scheme was introduced for the distribution of rice from the three northern deltas and Tanjore to other districts. The maximum price at which rice should be sold was also fixed. These schemes for regulating the more important surpluses of rice in the Province did not, however, increase its supplies and it became necessary to look to other sources of supply. The whole country had to look to Burma as its main rice reserve in spite of the fact that Burma rice was not much in favour with consumers in those days. The Indian Foodstuffs Commissioner regulated the conflicting claims of importing Provinces and determined the quantities which they should be permitted to buy. Importers were allowed to sell only to retailers in the town of importation and to upcountry dealers whose orders were countersigned by officers appointed by Government.

The controls were generally abolished by 1921.

Features of Indian Agriculture between 1920 and the out-break of the present war

470. Between 1920 and 1939 the two significant features of Indian agriculture were—

(1) increase in the area under non-food crops;

(2) the increasing importance of imports from Burma and Indo-China.

The following statement gives the acreage under food and non-food crops for the period :—

All-India acreages under food and non-food crops in million acres

Year.	Net area sown.	Food crops.	Non-food crops.
(1)	(2)	(3)	(4)
1920–21	197·3	143·6	53·7
1921–22	207·2	158·6	48·6
1922–23	208·6	159·2	49·4
1923–24	206·2	151·3	54·9
1924–25	210·9	154·1	56·8

Year. (1)	Net area sown. (2)	Food crops. (3)	Non-food crops. (4)
1925–26	208·6	150·1	58·5
1926–27	208·5	150·4	58·1
1927–28	206·5	149·9	56·6
1928–29	210·6	152·9	57·7
1929–30	210·4	151·9	58·5
1930–31	211·1	154·5	56·6
1931–32	211·4	156·9	54·5
1932–33	210·1	153·0	57·1
1933–34	214·0	157·7	56·3
1934–35	208·8	152·7	56·1
1935–36	209·7	153·2	56·5
1936–37	213·7	157·0	56·7
1937–38	213·5	154·9	58·6
1938–39	209·4	153·9	55·5
1939–40	210·0	154·8	55·2
1940–41	214·0	155·4	58·6

The statement below gives the acreages for groundnut, cotton and tobacco, the three principal cash crops :—

(Figures in millions of acres.)

Year.	Groundnut.		Cotton.		Tobacco.	
	All-India.	Madras.	All-India.	Madras.	All-India.	Madras.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1920–21	1·8	1·6	13·7	2·1	0·8	0·2
1921–22	1·7	1·5	11·3	1·8	1·0	0·2
1922–23	2·1	1·8	13·3	2·3	0·9	0·2
1923–24	2·2	1·8	15·1	2·6	0·9	0·2
1924–25	2·2	1·9	17·1	2·9	0·9	0·3
1925–26	3·2	2·6	17·7	2·9	1·0	0·2
1926–27	3·3	2·7	15·2	2·2	0·9	0·3
1927–28	4·1	3·3	14·5	2·1	1·0	0·3
1928–29	4·7	3·7	16·2	2·5	1·0	0·3
1929–30	4·3	3·2	15·8	2·5	1·0	0·3
1930–31	4·6	3·6	13·8	2·0	1·0	0·2
1931–32	3·8	2·6	14·3	2·2	1·0	0·3
1932–33	4·9	3·5	12·8	2·0	1·0	0·3
1933–34	5·3	3·8	14·1	2·2	1·0	0·2
1934–35	3·4	2·4	14·0	2·3	1·1	0·3
1935–36	3·6	2·5	15·2	2·7	1·1	0·3
1936–37	4·8	3·5	14·8	2·5	1·0	0·3
1937–38	6·4	4·7	15·4	2·5	1·1	0·3
1938–39	5·7	3·8	13·9	1·9	1·2	..
1939–40	5·5	3·6	13·3	2·2	1·2	..
1940–41	6·0	3·9	14·1	2·4	1·1	..
1941–42	4·5	2·8	14·8	2·5	..	..
1942–43	4·8	3·3	11·6	2·2	..	0·3

In Madras groundnut had established itself as one of the important dry cash crops. The groundnut market, however, has all along been mainly a foreign one. Groundnut was favoured not merely because there was a good foreign market but also because there were many well-established foreign firms operating in this country as buying organizations. The expansion of the textile industry led to the stabilization of cotton as perhaps the most important non-food crop in Indian agriculture. In fact, such research as has been conducted so far in respect of better strains, and the organization of marketing has been dominantly confined to cotton. Tobacco of the 'Virginian' type came to be established largely due to the efforts of the Indian Leaf Tobacco Development Company in Guntur and neighbouring districts in this Province. The only other crop of any importance that ousted pure food crops is sugarcane but it may be treated as a food crop for present purposes.

The quantities of rice imported from Burma and Siam are given below:—

Imports of rice from Siam and Burma

Year.	Siam and Indo-China. TONS.	Burma. TONS.
1928–29	6,416	382,077
1929–30	5,353	346,876
1930–31	4,617	396,858
1931–32	23,217	517,207
1932–33	35,293	417,829
1933–34	80,327	573,707
1934–35	29,398	714,504
1935–36	65,726	854,856
1936–37	8,050	698,483
1937–38	81	699,320
1938–39	16,315	317,331
1939–40	249,764	779,327

Burmese imports rarely exceeded 10 per cent to 15 per cent of local production but the presence of Burmese rice had a steadily depressing effect on local prices. It acted as a cheap alternative which *could* be purchased, if necessary.

Trend of prices

471. The graph appended and the statement below give the particulars of prices :—

Retail prices of principal foodgrains in the Madras Province in rupees per imperial maund

Year. (1)	Rice second sort. (2)	Cholam. (3)	Cumbu. (4)	Ragi. (5)
1913–14	5·33	3·08	3·16	2·93
1914–15	5·01	2·85	2·93	2·79
1915–16	4·96	2·74	2·82	2·67
1916–17	5·12	3·02	3·02	2·80
1917–18	5·38	3·46	3·25	2·95
1918–19	7·26	5·28	4·75	4·72
1919–20	8·90	6·62	6·53	6·18
1920–21	7·73	5·36	5·61	5·09
1921–22	7·43	4·91	4·95	4·54
1922–23	7·08	4·22	4·61	4·22
1923–24	6·97	4·38	4·68	4·20
1924–25	7·94	4·83	5·03	4·59
1925–26	7·36	4·30	4·61	4·19
1926–27	7·27	4·49	4·82	4·30
1927–28	7·35	4·57	4·84	4·35
1928–29	6·79	4·17	4·38	4·09
1929–30	6·20	3·69	3·98	3·53
1930–31	4·82	2·67	2·90	2·64
1931–32	4·18	2·41	2·50	2·34
1932–33	4·10	2·30	2·60	2·10
1933–34	3·26	1·97	2·23	1·99
1934–35	3·80	2·51	2·67	2·40
1935–36	3·94	2·59	2·78	2·56
1936–37	3·79	2·51	2·61	2·36
1937–38	3·91	2·53	2·56	2·26
1938–39	3·93	2·54	2·63	2·35
1939–40	4·24	2·75	2·87	2·73
1940–41	4·83	2·76	2·92	2·72
1941–42	4·54	3·13	3·18	2·96
1942–43	8·23	5·51	5·78	5·31
1943–44	9·82	7·61	8·19	7·64

473. After the introduction of rationing, the Grain Purchase Officers were required to make purchases for supply to rationed areas also.

The ceiling F.O.R. prices for rice exports from surplus districts were fixed at the beginning of each Kharif year (1st November to 31st October) and continued unchanged for a whole year. They were revised thereafter with reference to the increase in cost of production and the prices of essential commodities other than rice.

Procurement had to be tightened up owing to the progressively deteriorating food situation. A scheme of intensive procurement was first introduced in six heavily deficit districts and it was later on extended to all the districts of the Province including the surplus districts. The essence of the scheme was that all surplus of foodgrains with the producers should be sold only to Government or their agents. For this purpose, Government fixed and notified village site prices at which paddy and millets should be brought by their procurement agents from the producers. This complete monopoly procurement of all surpluses by the Government agents at fixed rates, stabilized prices and effectively stopped their taking an erratic turn.

Most of the other grains are imported from outside the Province under the plan of the Government of India either by the Government themselves or through select wholesale merchants. In either case the wholesale and retail prices are fixed by the Collectors and the merchants are directed to sell only at these prices. The sanction for the enforcement of these prices is only the threat of cancellation of the foodgrains licence.

Principles arising out of the various control measures

474. The description given above of the measures taken in the United States of America, Japan and India is important as indicating both what can be done hereafter and what cannot be done. The American system was designed to meet a situation when prices were falling, exports had dwindled and stocks were accumulating. The Japanese measures arose out of the abnormal conditions of the last war but were stabilized so as to be suitable for a long-term Price policy. The measures taken in this country both during the last war and the present war and after are primarily emergency arrangements devised to meet a situation of deficit supplies and increasing prices. Except the Japanese system, the other measures have been short-term in scope and urgent in character—both characteristic of remedies for periods of crisis. A fall in prices is generally accompanied by measures for control of imports, reduction of acreage, grant of subsidies, expansion of credit facilities and reduction of the debt burden by legislation and during war time a deficiency of supplies and a tendency for prices to rise is controlled by the grant of licences to the trade, restriction of export, control of movements, Government control of purchase

and encouragement to grow more food. Neither of these conditions is an evoluntionary development and therefore they have to be used with caution in a post-war price policy.

475. A study of the conditions that call for price control reveals that both when prices were low as well as when prices were high the search has been for what is called ' parity ', viz., that the goods which the farmer buys should not cost more than the goods which he sells during a normal period. Thus there is no inherent defect in high or low prices as such, and one of the most important aspects of a period of unsettlement is the rise in the price of some commodities and the fall of some others or an unequal rise or fall amongst various commodities. When this upsets the normal balance of production and income as between various groups the need for controlling prices so as to approach parity becomes necessary. In a short-term policy of price control the search for parity is generally confined to finding out a base period when conditions may be said to have been normal and then trying to adjust various prices so as to conform to the price levels obtaining at that period. In America the period 1909 to 1914 was taken as a base period for the regulation of agricultural price. For a long-term policy, however, in which various schemes for industrial and other developments are progressing, there is certain to be an alteration of the relation of one group of prices to another. This is what makes price control of any particular commodity over a long-term inherently difficult. In his report to the President of the United States of America for the year 1936 the then Secretary for Agriculture observes :—

" Since parity prices are not a sufficient test of what constitutes a permanently good rural-urban balance it may seem necessary to find some other definite basis for determining what share of the national income should go to agriculture. It is impossible to set a definite percentage. Consumers would rebel against high prices and the farm share of the national income would decline again. It is possible, nevertheless, to lay down principles, if not a percentage, for regulating the farm share of the national income. Sound projects for increasing that share must not hurt other interests and must have enduring elements. The national income depends on the national production on farms and in factories. It is the country's total command of the goods and services. As the total increases the share going to agriculture will rise without cutting into the amounts available to labour and industry. Amicably to divide an increase in the national income is quite different from quarrelling over a decrease produced through scarcity. A fair return for agriculture would then harmonize with general economic progress.

Fundamentally, therefore, the problem is to give agriculture its due share of the national income through an approach to abundance rather than an approach to scarcity and this necessitates an increase in both farm production and factory production but at different rates.

476. Agriculture must get industry to agree the parity income for agriculture should come about, not on an extremely high price

level through competitive scarcity but on a lower level consistent with increased production and consumption. Such a balance would harmonize with progress, with a rising standard of living in both town and country, and with a just diffusion of the resulting benefits. Agriculture may fairly ask an increasing share of an increasing total income but not an increasing share of a diminishing total.

The interest of agriculture in parity prices will then coincide with labour's interest and increased employment. Any other method will lead to reduction of industrial employment. Over-emphasis on prices to the neglect of production leads to scarcity: Larger output at lower unit prices with industry leading the way is essential to safe progress towards parity prices and a fair share of the national income for agriculture ".

This extract is important as showing first that emergency measures during periods of falling prices cannot be made the basis of a long-term policy of control, *second* that rationalization of production is the basis of a safe regulation of prices and *third* that while changing conditions will require adjustments of price levels, the main principles should be that there should be an all-round increase of production and that agriculture must be given a due share of this increase of real income.

The relegation of price control to a secondary place and the emphasis on increased all-round production is an aspect of long-term regulation that cannot be sufficiently emphasized.

477. This naturally leads to a proper emphasis on crop planning. Price is conditioned by the relation of supply to demand. Over a long period price acts on supply and demand in such a way as to render adjustments of production possible. Within this period short-time prices will fluctuate round about an equilibrium for the period in question. This long-term equilibrium may be thought of as a ' norm ' about which the shorter-term prices fluctuate, always tending to be pulled back towards this normal price. This normal price itself is not a static fixed price but moves up and down as supply and demand gradually change. Normal price may therefore be defined as the long-time trend of prices resulting from the gradual adjustment of demand and supply. It is for this reason that the proper adjustment of supply to demand assumes great importance in long-term planning. It is relevant to notice that current costs of production have no effect on current prices in a free market but that they tend to affect future production and future prices. This is especially so in agriculture where the curtailment of production to prices takes time to adjust itself. The greater ability to producers of manufactured goods as compared with the agriculturists to both name and receive a price covering cost of production is due to various factors. *First*, manufactured goods are continuously rather than seasonally produced. *Second*, manufactured goods usually are non-perishable and can be stored in order to take up the slack in the market. *Third*, production of manufactured goods can be speeded up or contracted much more easily than the production of farm products. Thus, while a fall in the demand and

therefore, in the price of any particular group of manufactured articles will lead to an easy adjustment of production to demand and in its turn is likely to create unemployment of labour, a fall in the price of agricultural products is likely to create not so much unemployment as a surplus of the stock available for sale. The importance of regulating the supply to the probable demand by proper planning is, therefore, much more important in agriculture than in any other industry and has necessarily to form the foundation of any measure for fixing and controlling agricultural prices. While during a period of crisis measures may be devised so as to adjust the existing supply to the demand by various measures of control and Government interference, a long-term measure of price control so as to give the agriculturist his due share of the national income can be sustained only by a concomitant arrangement of intelligent crop-planning which in its turn is based on a scientific estimate of the demand.

478. The main principles of price control and fixation may thus be stated to be : *first*, the experience of other countries as well as India shows that measures adopted during periods of crisis have to be used over periods of peace with great caution; *second*, parity prices should anyhow be given to agriculturists, by parity meaning the price of the products of agriculture in relation to the price of the other products based on suitable index numbers with a base as an acceptable normal period, *third*, over a long-term, price fixation is less important than expansion of all-round production; and *fourth*, no system of price control will ever work for long which is not based on correct crop-planning.

Definition of the principles and limits of the present enquiry

479. Price regulation for agricultural production is a long-term peace measure and is examined here as such. It is assumed that a system of crop-planning will be introduced. Based on this assumption the practical details of a scheme of price control may now be examined.

There is first a distinction of great relevancy between food crops and non-food crops. It is seen from the statement in paragraph 470 above that food crops predominate in area. The statement in paragraph 471 above gives the prices of the principal foodgrains over a series of years. Rice is the main food crop of this Province and it is seen that over a series of years the prices of other foodgrains follow the price of rice. We may, therefore, address ourselves to two main questions. *First*, is it necessary to fix the price of all foodgrains or only of rice, seeing that the others are likely to follow the price level of rice? *Second*, is it necessary and if so what are the methods to be followed in fixing prices for non-food crops? Sugarcane may be treated as a food crop for present purpose. (For a similar enquiry certain other Provinces in the north will take wheat instead of rice.)

There are several advantages in confining attention to rice in this Province. It has already been noticed that the prices of other grains follow the price of rice and hence in effect the regulation will largely extend to other crops. Rice is " protected " crop in that it is largely irrigated and hence a policy of crop-planning can be worked more satisfactorily for it than for other crops. It is also grown in large compact areas from which surplus can be taken and controlled. It is significant that the present controls are largely for rice. If, as a result of experience, it is seen that the confining of attention to rice alone leads to maladjustment in the production and price of other food crops the question can then be taken up.

480. The principles to be followed in price fixation are more or less the same for food as well as non-food crops but the demand for non-food crops is subject to conditions and influences which are not similar in character to the demand for food crops. Food crops cater to a primary need of life and once a certain optimum is reached, except for allowances to be made for increase in population, the demand will be inelastic. But crops which are the raw materials for numerous industries depend mainly on the development of these industries for their demand. This demand is often subject to international influences and variations of demand will be more frequent and greater than for food crops. The grower of non-food crops, however, is subject to the same disability as the grower of food crops in that adjustment of acreage to demand is not easy. Crop planning has, therefore, to be done much more carefully for non-food crops. The difference is not so much one of character as one of degree and calls for separate adjustment of production to demand for each crop. Such an adjustment is to some extent done at the present time for cotton, for which there is a large domestic demand. The recent measures adopted by the Government to reduce the output of short staple cotton is an instance in point.

481. Both cost of production and a fair margin over cost are subject to controversy. As regards cost of production the difficulty is in securing reliable data which will be of sufficiently wide application. As regards a fair margin the question is purely what standard of living is considered to be reasonable to the agriculturist. As a commencement, it will be idle to pretend that price fixation for agriculture is possible so as to allow a certain minimum standard unless a similar measure is adopted for the producers of all other commodities in the country so that a new parity in real income is established all round. As long, however, as such a general development does not take place, the principle of a fair margin will have to be confined to existing standards available to the country. In other words, a minimum price will have to be taken by reference to a base period which is considered to be satisfactory, and then the price regulated so that the gradual increase in price is justified by previous long-term trends. This is because it is seen that normally all prices rise gradually over a long period of time subject to violent fluctuations during short intervals of crisis, which may be eliminated for the purpose of calculating the normal tendency to rise. The American

method was to hearken back to the parities prevailing in the base period. This was suited to a period when prices had fallen below minimum levels and had to be worked up to them. The present suggestion is to start with the base parity plus a rise that allows for a steady long-time rise based on the rate of increase averaged out for a long period. It is assumed that this is above cost of production. As present prices are higher than this level, this will be taken only as a " floor " for the future. The " ceiling " will be present prices, suitably adjusted to parity with reference to available index number of cost of living.

In either case the main principles of price regulation are the same, viz., that in any event ' parity ' prices have to be guaranteed and that long-term regulation should, in addition, aim at guaranteeing a fair margin over costs sufficient to enable the agriculturist to lead a decent standard of life.

Results of short-term parity fixation

482. A perusal of the price curves in this Province shows that up to 1914 prices were moving fairly steadily with variations during short periods but that subsequent to 1914 variations even over short periods have been violent. I have, therefore, taken 1914 as the base period for calculating parities. The rate of increase during the previous period for which figures are available, is taken for graduating the increase after 1914. If cost of living figures had been available for this entire period then it would have been an ideal position but unfortunately the period for which index numbers of cost of living are available is very much shorter. Further, the cost of living indices are not truly rural figures. In future calculations it will be necessary to take correct rural figures. But in the countryside price conditions do not vary considerably between urban and rural areas. For the present purpose the figures are sufficiently representative. The principle should be not to fix a rigid price but to follow the Japanese method of having a standard minimum and a standard maximum within which fluctuations will be allowed and within which further price variations in respect of varieties also should be permitted. The floor will be cost of production plus a margin which will bring the price up to the level that would have been attained if the normal 1914 curve is brought up to the present day by reference to a gradation that existed in the past. In other words, for all practical purposes it will be the price that would have obtained if the curve had followed a normal course. The maximum should be related to the present cost of living and should be fixed by reference to the parity price for agricultural produce taking 100 for cost of living as well as for agricultural price in the immediate pre-war period.

Long-range planning cost of production

483. While this may be taken for the commencement of the work, specific enquiries that are necessary for a satisfactory long-term policy have to be started. This applies with special force to

figures relating to cost of production. Satisfactory figures of cost of cultivation are difficult to obtain as agriculture is a method of living even more than an investment, so that people who live on the land will carry on cultivation in circumstances that will be considered unremunerative in any other industry. The individual variations are so wide that a typical figure is almost impossible of ascertainment. In this Province a great deal of work has been done in collecting data regarding cost of cultivation, e.g.—

(1) the original settlement reports;

(2) recalculations in a few of the resettlement reports;

(3) some South Indian villages by Dr. Gilbert Slater containing the results of investigations by the students of the Madras University in select villages;

(4) a detailed monograph by the Statistical Section of the Imperial Council of Agricultural Research for sugarcane and cotton areas in this Province;

(5) figures collected for the Government agricultural farms;

(6) figures collected by the Registrar of Co-operative Societies and the Director of Agriculture for various districts; and

(7) a recent report by the Board of Revenue on costs of cultivation.

The differences revealed in these studies are vast not only as between different tracts for the same crop but also for the same crop in the same tract. The explanation is partly that prices paid in different years for such items as seed and manure vary and partly that the items that have been taken as entering into costs have not been uniform, but mainly that the expenditure as between one ryot and another does vary to such an extent as to render the figures available not typical as a basis for price regulation on a universal scale. This is not to say, however, that in future cost of production on a fairly typical scale will be impossible to obtain and that, therefore, this should be completely abandoned as a method on which price regulation should be based. All that is intended to be brought out is that the work has to be done with great caution and with the particular objective in view. For present purposes these studies are useful as bringing out the fact that in normal times cost of production is roughly half the price in the case of paddy and one-third in the case of millets. Considering the inherent difficulties of ascertaining average costs it seems necessary to prescribe certain principles on which cost ascertainment should be based. The first principle is that what has to be taken is an average and not an optimum. Secondly, this average should be sought for all along the line, i.e., class of land, nature of the ryot, methods of cultivation, area of holding, tenure of landholding and all such similar factors. Thirdly, the average should not be a theoretical one but a typical one. Thus it is not proper to calculate an average by reference to the resultant figures of a number of good

and bad farms but it should be done by reference to a typical farm in a tract, actual farm costs being ascertained. A search for principles in regard only to conditions that make a particular farm an average one and then the ascertainment of the actual costs of that particular farm will render the calculations a greater approximation to truth than otherwise. Fourthly, the items that are allowed in costs should be defined by reference to the greatest common factor of costs in any particular area. For this purpose an owner-cultivator should be taken and not a landlord who has his lands farmed by others. This is because the majority of agriculturists in this country are owner-cultivators. A perusal of the enquiries made so far shows that the common items that enter into costs are (1) seeds, (2) manure, (3) annual value of implements and carts, (4) labour and (5) tax. Fifthly, these enquiries should be conducted in respect of quantities and not money values; in other words, the amount of labour employed, the quantity of seed and manure used should be reported and current prices calculated for them. Sixthly, these enquiries should be made in well defined regions like the deltas, the Central districts, the Ceded districts where conditions are homogeneous. Seventhly, the enquiries should be conducted throughout one cultivation season as and when particular operations take place. Subsequent work will be confined to correcting the data which form the main basis of the cost enquiry. It is significant to note that the Japanese system of price control is based on enquiries into cost of production.

Long-range planning margin over costs

484. As regards the availability of a proper margin over costs of production this raises the fundamental question whether it is intended to give to agriculturists a price which is considered sufficient to enable a minimum standard of life or whether nothing more is attempted than the maintenance of a *status quo* which has established itself as the parity price for agricultural produce by reference to long-term trend of prices. By reference to the pre-war level of prices the authors of the Bombay Plan have given the following estimate for a minimum standard of living :—

I. *Food.*—Per capita requirements per diem—

	oz.		oz.
Cereals	**16**	**Fruits**	**2**
Pulses	**3**	**Fats and oils**	**1·5**
Sugar	**2**	**Whole milk**	**8**
Vegetables	**6**	**Or meat, fish and eggs** ..	**2·3**

It is estimated that a nutritive diet of this kind would cost Rs. 65 per annum for an adult and very little less for a growing child at pre-war rates. For a family of five members the expenditure under food per annum would be Rs. 325.

II. *Clothing.*—Consumption of cotton piecegoods per capita in 1929—

	In yards.		In yards.
United States of America..	64·0 (square yards).	Denmark	30·0
		Japan	21·4
		Egypt	19·1
Canada	37·7	Brazil	18·9
Sweden	36·0	Iraq	16·9
Germany	34·0	India	16·1
Malaya	30·6	Greece	15·0

In the light of these figures the estimate made by the National Planning Committee of the minimum requirements of clothing in India, viz., 30 yards per head is reasonable. At the rate of 3½ annas per yard, the cost would come to Rs. 6–9–0 per year per head. For a family of five members the cost would be Rs. 32–13–0.

III. *Shelter.*—One hundred square feet of house room per head is considered necessary and for a family of five, 500 square feet would be required. The cost of building such a house in rural areas was estimated at Rs. 400 and at twice that sum in urban areas at pre-war rates. The recurring expenditure on maintenance at 7½ per cent for rural area works out to Rs. 30.

IV. *Health and medicine.*—The Bombay Plan has worked out the minimum needs under this head as involving a recurring annual expenditure equivalent to that under housing and hence the minimum expenditure for a family of five members may be assumed to be Rs. 30 per annum.

V. *Primary education.*—Expenditure under this head is assumed in the Bombay Plan at about one-third of that under housing or health. Rupees 10 therefore, may be adopted for a family.

Thus the total expenditure per annum for an absolutely minimum standard of life providing only for necessities is as given below for a family of five members :—

	RS.		RS.
Food..	325	Primary education ..	10
Clothing	33		
Housing	30	Total ..	428
Health and medicine ..	30		

This is slightly in excess of the figure assumed in the Bombay Plan, viz., Rs. 75 per head per annum which works out to Rs. 375 per annum for a family of five. Rupees 375 is taken as the irreducible minimum. The lesser provision for children may be taken as a correcting factor.*

* *Note.*—The Bombay Plan proceeds on the basis of national income and national expenditure and it is not quite clear whether and if so to what extent State expenditure and private expenditure have been mixed up in evaluating the minimum per capita needs. For example, items such as food, clothing and shelter would constitute essentially private expenditure whereas medicine and primary education would be essentially State expenditure. In view however of the lack of more definite data and of the probability that the variation between the two classes of expenditure is not likely to be great when dealing with an absolutely minimum standard of life, the figures given in the Bombay Plan have been adopted without change.

485. Assuming that the cost of production is half the value of the yield in the case of paddy and one-third of the value of the yield in the case of millets the net income per acre at the different price levels obtaining during the three periods 1913–22, 1923–32 and 1933–39 is worked out below :—

	1913-22.		1923-32.		1933-39.	
	Rice.	Millets.	Rice.	Millets.	Rice.	Millets.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.
Average price per maund ..	6 6	4 1	6 5	3 13	3 12	2 7
Yield per acre in lb.	1,000	700	1,000	700	1,000	700
Total value of produce ..	77 7	34 9	76 11	32 7	45 9	20 12
Deduct costs of cultivation, half in the case of rice and one-third in the case of millets	38 12	11 8	38 6	10 13	22 12	6 15
Margin available for living ..	38 11	23 1	38 5	21 10	22 13	13 1

To get Rs. 375 as the minimum income per family the minimum holding necessary for paddy and millet areas separately are given below :—

Crop.	Minimum income required.	Income actually realized per acre.				Number of acres to get the income in column (2).
(1)	(2)	(3)				(4)
	RS.	RS.	A.	P.	ACS.	
Paddy	375	38	11	0	10	1913–22
		38	5	0	10	1923–32
		22	13	0	16	1933–39
Millets	375	23	1	0	16	1913–22
		21	10	0	17	1923–32
		13	13	0	27	1933–39

The figures of 16 acres of paddy and 27 acres of millets acreage required for 1933–39 is far in excess of the fairly constant acreage required in the previous two periods considered above and this variation may be accounted for as being mainly due to the constant figure of Rs. 375 taken as required for living for all the three periods whereas something less than Rs. 375 would have sufficed during the last of the three periods when prices were low. A fair average for an economic holding for a family of five persons seems to be 10 acres of wet (paddy) and 15 acres of dry (millets) on the average.

486. The actuals may now be examined. Usually holdings do not consist exclusively of wet or exclusively of dry lands. It is, therefore, desirable to adopt the ratio of an acre of wet as equal to two acres of dry for purposes of calculating the economic aspect of the average holding as it exists. This increased ratio of 1 to 2 instead of 1 to 1½ is necessary in order to provide for the greater uncertainties of dry cultivation.

Instead of dealing with one average for the whole Province it would be better to take the important wet districts and examine

the extent of wet holdings there, and to take the important dry districts and examine the extent of dry holdings there.

Important wet districts

Districts.	Acres average holding. Dry.	Wet.	Average in terms of wet.
(1)	(2)	(3)	(4)
East Godavari	2·9	1·5	3·0
West Godavari	1·8	2·2	3·1
Kistna	2·5	1·4	2·7
Guntur	2·9	0·7	2·2
Tanjore	1·0	2·2	2·7
Trichinopoly	2·8	0·5	1·9
Total ..	13·9	8·5	15·6
Average for the six districts	2·3	1·4	2·6

Important dry districts

Cuddapah..	3·7	0·4	4·5
Anantapur	9·2	0·7	10·6
Bellary	11·6	0·2	12·0
Kurnool	7·0	0·2	7·4
Chingleput	1·3	1·6	4·5
North Arcot	2·2	0·7	3·6
Madura	2·5	0·7	3·9
Tinnevelly	2·5	0·6	3·7
Coimbatore	7·9	0·3	8·5
Total ..	47·9	5·4	58·7
* Average for the nine districts	5·3	0·6	6·5

Thus against 10 acres of wet or 15 to 20 acres of dry which appears to be an economic holding as worked out above we have actually average holdings of only 2·6 acres wet in wet districts and 6·5 acres of dry in dry districts. So the holding will have to be quadrupled in the case of wet lands in wet districts and trebled in the case of dry lands in the dry districts if they are to be economic.

487. Alternately, the price of the agricultural produce will have to be fixed at levels which represent the multiple of the economic holding to the present holding in order to ensure a minimum standard of life. Any increase of yield, price remaining the same, would naturally reduce this multiple. Both these measures are outside immediate practical politics. But they are useful and necessary as indicating certain standards to be attained in the future not merely in agriculture but in all industries.

* *Note.*—Joint pattas are not taken into account in arriving at these figures. The number of shareholders in joint pattas is often very great and individual shares shrink to small extents to balance the fact of many persons owning single pattas and in addition a share in joint pattas, the size of the family often being more than five can be taken as the correcting factor.

Long-range planning—Main conclusions

188. The work should be commenced by taking present parity levels as the maximum and the graduated level on the basis of the 1914 base as the maximum. Meanwhile, reliable cost of production figures and cost of living indices for rural areas should be gathered. Price fixing should then be done on the Japanese method, i.e., a minimum price that varies between cost of production plus freight and other charges on the one hand and the ratio of the index number of the price of rice to that of all commodities on the other; subject to a percentage reduction varying from 10 to 20 per cent; and a maximum that varies between a price calculated on the basis of the cost of living examined in the year and a price calculated in the relation of the index number of the price of rice to the index number of the prices of commodities in general subject to an increase of 20 to 30 per cent. The prices of the various notified grades can also be fixed within these limits by reference to the normal difference between one grade and another. There is now a variation in price between harvest and subsequent periods. This is the result of unsatisfactory storage and credit conditions and is likely to disappear in course of time, especially if buffer stocks are built up and hence no changes in prices should be allowed for this feature in a rational price regulation scheme. It is needless to add that Government should buy and sell where necessary in order to keep prices within these limits.

It is inevitable that emphasis will all the time be on food crops.

CHAPTER XI—THE FINANCING OF AGRICULTURE AND THE DEVELOPMENT OF CO-OPERATION

Introductory

489. The financing of agriculture is a subject of primary importance. Being a seasonal industry in which there is an inevitable time-lag between the investment and the outturn, credit is of the very essence of successful agriculture, and suitable machinery for the provision of credit to agriculture is the measure of its success as an industry. This is much more so in a Province of small holders with inadequate surplus resources.

Credit requirements of agriculture

490. The amount of credit which ryots require for crop production is dependent on several factors which vary with the nature of the crop, the locality, the holding and the size of the family. A ryot requires credit firstly, for cultivation expenses, secondly, to meet expenses connected with the maintenance of his family and thirdly, if he is indebted, to meet the interest charges on his debts. The total cultivated area in the Province is about 37 million acres, including areas cultivated more than once. Out of this, about 12 million acres are raised with irrigated crops. The cost of cultivation of an irrigated crop is generally more than that of a dry crop. Manuring is necessary and irrigation or water charges have to be paid. Post-cultivation expenses are also generally higher. Cultivation costs include several items like seed, cattle labour, human labour and manure. A ryot may probably have his own stock of seed. He generally owns his cattle and all cattle labour is generally provided by himself or is exchanged. Though the practice of hiring cattle is common, it is not prevalent to such an extent as to vitiate the estimates of cost for the average ryot. His out-of-pocket expenses, so far as cattle labour is concerned, are confined to purchase of cattle-feed and to their replacement when they become old or die. Human labour is provided for by himself and his family and whenever hired, it is paid for in cash or in kind. Manuring is generally done with cattle manure, though the use of oil-cakes and artificial fertilizers is becoming more popular in raising irrigated crops. Taking all these and the wide variations in cultivation practices into consideration, it can be safely estimated that Rs. 30 will be the cash requirement per acre for an irrigated crop under present conditions. Cash requirement is different from cost of cultivation but the former may be taken as the basis for the purpose of estimating the credit required by the ryot. Considering the present high cost of cultivation, Rs. 40 will not be an over-estimate. However, Rs. 30 is taken to be on the safe side, and

as a more suitable " long range " figure. On this basis, the total cash requirement for the 12 million acres of irrigated crops will be Rs. 36 crores. The total cropped area under dry crops is around 25 million acres. Dry crops are seldom manured, except with varying doses of cattle manure which is generally available with the cultivator himself. There are no irrigation or water charges to be met. On the basis of Rs. 15 per acre, i.e., half the cost adopted for the wet crop, the total cash requirement for raising dry crops on 25 million acres amounts to Rs. 38 crores. The cultivation of the entire 37 million acres with both wet and dry crops in this Province therefore, requires an outlay of Rs. 74 crores. In estimating the credit requirements, the fact that there are many ryots who are rich and do not require any credit has to be borne in mind. The bigger-landowners more or less belong to this class. A vast number of prudent cultivators require only partial help. It is the small holder, who is generally indebted that has necessarily to borrow. Ryots owning one-third of the cropped area in the Province may be taken as requiring no outside financial help. This leaves Rs. 50 crores to be financed by outside agencies.

491. The second item for which a ryot borrows is the maintenance of his family. For all practical purposes, it has to be presumed that the proceeds of the previous harvest will be available for this purpose. This may not, however, be the case always. There are instances where the proceeds of the harvest are just sufficient to meet the land revenue and the high interest charges on previous debts. There are other cases where financial help is required to supplement the income from the land. Such accommodation may be required temporarily. It is not possible to make even a rough estimate of the requirements for such a varying demand.

492. The third main item of expenditure is payment of interest on prior debts. There is no correct estimate of the amount of indebtedness among the ryots of this Province. [1] Mr. W. R. S. Sathianathan estimated it at Rs. 200 crores in 1935. Since then, the passing of the Madras Agriculturists' Relief Act, and the increased prosperity of the agricultural population consequent on the rise in prices of agricultural commodities owing to war conditions have helped the ryots to pay off some of their debts. Taking advantage of the rise in land values in recent years, some ryots have also sold portions of their land and discharged their debts. The present volume of rural indebtedness may therefore be estimated at Rs. 100 crores. This figure is only a " guestimate " taking into account the factors mentioned above. The interest charges and sinking fund allowances on this debt can together be estimated at Rs. 10 crores per annum. All these items together give the total agricultural credit requirements of the Province at Rs. 60 crores. The Banking Enquiry Committee also in 1930 estimated the annual credit requirements at Rs. 60 crores. The

[1] Report on Agricultural Indebtedness by W. R. S. Sathianathan, page 41.

same estimate during the present time when the cost of cultivation has considerably gone up may be justified by the reduction in interest and sinking fund charges, as a result of reduction in both the capital and the rates of interest.

Estimate of rural indebtedness

493. [1] The first attempt to assess the rural debt of the Province was made by late Sir Frederick Nicholson. He estimated the total rural debt in 1895 at Rs. 45 crores. He opined at that time that the debt borne by the Madras ryot was heavy and its interest high (commonly 18 per cent) and that it had been incurred mostly for unproductive purposes. [2] The next estimate of rural indebtedness was made by the Provincial Banking Enquiry Committee in 1930 at Rs. 150 crores, though they qualified the estimate by saying that it could not be regarded as very reliable. [3] In 1934, Dr. P. J. Thomas of the Madras University estimated that the total debt had increased to Rs. 200 crores. [4] In 1935, the Government appointed Mr. W. R. S. Sathianathan to investigate the problem of rural indebtedness as affected by the economic depression. In the light of his investigations, he estimated the total agricultural debt at Rs. 200 crores. According to him, the debt worked out at Rs. 38 per head of population, Rs. 194 per family, Rs. 63 per acre of occupied land and Rs. 21 per rupee of assessment. Out of the total debt, he estimated 47 per cent as mortgage debt, 50 per cent as unsecured and 3 per cent as having been obtained on the security of movables.

Causes and trend of agricultural indebtedness

494. The causes of agricultural indebtedness have been studied time and again. They fall under two heads—(*a*) loans for the carrying on of agricultural operations and (*b*) loans for maintaining the family of the agriculturist. The two are connected in that an insufficient income from the land leads to borrowing for family expenses. Very little purpose is served by dilating on the poverty of the ryot, his ignorance, improvidence, love of display on ceremonial occasions and the like. The ryot is a member of a community which follows certain customs and these tie him down in a manner that casual observers fail to appreciate. Marriage expenses are generally pointed out as an example of extravagance, but any middle class Indian knows the inexorable demands that custom makes on such occasions and the ryot is not an exception in the matter of marriage expenditure. Loans for agricultural operations are inherent in the nature of the industry, and besides, in a country where agriculture depends so much on the monsoon, failures of crop are frequent. Further, the capital of the agriculturist is generally locked up in land and so he needs credit for his working expenses.

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[1] Report of the Committee on Co-operation, 1939–1940, Chapter III, page 71.

[2] Provincial Banking Enquiry Committee Report, 1930—Vol. I, Chapter IV, page 77.

[3] The Problem of Rural Indebtedness by P. J. Thomas, page 10.

[4] Report on Agricultural Indebtedness by W. R. S. Sathianathan, Chapter IV, pages 40 and 41.

495. It has been stated by various authorities that when there is an increase in the total per capita income owing to increasing trade or manipulation of currency or rise in prices, the volume of indebtedness also increases. This is attributed to the availability of money for lending and of surplus income to repay. This has been the case during the last fifty years. Conditions recently have definitely improved. The rise in agricultural prices has helped the ryots in many cases to repay debts due to money-lenders and sowcars. This is contrary to the experience which obtained during the first World War. During that war when commodity prices rose, land values also went up. Many ryots who were indebted were willing to take advantage of the rise in prices and actually parted with their lands. Those who bought the lands believed that the high prices would permanently continue but were disillusioned when commodity prices declined. Moreover, except for a fraction of the money which they could put up as their own for purchase of land, the remaining funds were entirely borrowed in the belief that the debts could easily be wiped off if the high prices of agricultural produce persisted. These two factors led to more borrowing and increased indebtedness. This resulted in untold misery for the borrowers as they could not return the sums borrowed as originally planned. The lessons learnt during the last war boom are fresh in the memory of all. During the present war, land values have gone up because there are very few sellers and those who are indebted are able to wipe off their debts by selling portions of their land and from the high prices obtained for their produce. There are very few who are willing to buy land with borrowed money. There is an accumulation of savings and funds even in interior villages. That the volume of rural indebtedness has come down is evidenced by the repayment of loans to land mortgage banks and other co-operative credit institutions.

496. From a detailed economic survey of 141 select villages all over the Province, Mr. Sathianathan indicated the following purposes for which borrowing was resorted to by ryots [1]:—

Purpose of borrowing.	Percentage.
Payment of prior debts	25·1
Marriage and other ceremonies	10·5
Payment of land revenue	3·3
Relief of distress	6·1
Agricultural expenses	10·0
Improvement of land	4·4
Education of children	1·4
Trade	12·9
Purchase of land	13·8
Construction of houses	5·6
Other expenses	6·9
Total ..	100·0

[1] Report on Agricultural Indebtedness by W. R. S. Sathianathan, page 42.

The percentage under 'purchase of land' appears to be an underestimate. Enquiries during resettlement operations showed that it was 44 per cent in the southern taluks of Salem, 30 per cent in the Nellore Delta and 42 per cent in Guntur. The survey also indicates that a substantial portion of the debt incurred is unproductive. It is seen that 25 per cent of the borrowing is for the payment of prior debt. [1] On a reclassification, the statement will read as follows :—

Debts for.	Percentage.
Productive purposes	37·1
Unproductive purposes	41·7
Education of children	1·4
Trade	12·9
Miscellaneous	6·9
Total ..	100·0

Thus it is seen that a substantial portion of the rural debt is unproductive, and this is a matter for anxiety. Part of it cannot be avoided, agriculture being so uncertain, but for the bulk of it the remedy lies in bringing more and more areas beyond the pale of rainfall vagaries and in a gradual rationalization of domestic expenditure.

[2] The investigation also revealed that 21 per cent of registered holders, 23 per cent of tenants and 36 per cent of farm labourers were free from debt. During resettlement operations it was found that 54 to 81 per cent of the ryots were indebted and that in the majority of the villages, more than 70 per cent were in debt. [3]The enquiry further showed that the per capita debt increased with the assets of the individual. The debt per head for farm labourers was only Rs. 15 while that for landholders paying assessment between Re. 1 to Rs. 100 was Rs. 211 and for those paying higher land revenue the average debt was Rs. 918.

Credit facilities

497. Rural credit in the Province is provided by the following agencies :—

(1) Village money-lenders
(2) Indigenous bankers
(3) Commercial banks
(4) Government agencies
(5) Co-operative credit societies.

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[1] Report on Agricultural Indebtedness by W. R. S. Sathianathan, page 42.
[2] *Ibid.*, page 40.
[3] *Ibid.*, page 42.

The village money-lender

498. The village money-lender occupies an important and influential position in the provision of rural credit. He provides the major portion of the credit requirements of the agriculturist. [1] Mr. Sathianathan estimated that 93 per cent of the credit requirements was met by money-lenders.

As in many other Provinces, professional money-lenders like the Marwaris and the Chetty banking community of the Ramnad district are not found in such large numbers in the rural areas of Madras. There are professional money-lenders who deal with the agriculturist, but generally they are found in towns and cities. Money-lenders in rural areas are mostly agriculturist *cum* traders. They own lands themselves and belong to the same community as the ryots of the locality. Their rates of interest range from 9 to 15 per cent. Loans are given mainly on pro-notes, on personal security or on joint security and also on mortgages of land. Periods are fixed for payment of interest and repayments of loans. Repayments are seldom made at the stipulated time, and so penal interest is usually charged. The three years' period of limitation for pro-notes leads to frequent renewals and the new principal is the sum total of the previous principal, unpaid interest and penal interest. Naturally, the debt increases very rapidly. After a few renewals, it will not be surprising to find that the original principal has doubled or trebled itself. Finally this results in a mortgage debt, when the land is mortgaged by the ryot to the money-lender. In a few years, the creditor applies for foreclosure of the mortgage and eventually takes possession of the ryot's land. The ryot loses his land and becomes a tenant or a labourer. In the progressive course of the debt, payments made by the debtor are sometimes not endorsed on the loan document. This is facilitated by the fact that the transactions between the creditor and the ryot form a continuous and long drawn out process. As the ryot's demands for money are frequent, it is difficult for him to find out the exact state of his account with the creditor at any one time. This picture, however, has to be mitigated in actual practice by reference to such circumstances as the personal angle and the shrewdness of some ryots. Further, the village money-lender gives the ryot " facile " credit. This no doubt has its dangers and tempts the ryot to borrow in excess of his needs, but in a country where most of the credit has to be assessed not by the property behind the loan but by the probability of repayment which can be judged only by the creditor's intimate knowledge of the debtor's antecedents and character, what may be called " personal " credit plays a large part. Mention should, in this connection, be made of shop-keepers who give credit in kind. The terms are often harsher than money loans and this is facilitated by the " invisibility " of the interest in commodity transactions. The chief

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[1] Report on Agricultural Indebtedness by W. R. S. Sathianathan, page 43.

drawback of the individual money-lending system is the forced deterioration of the ryot. The money-lender does not enquire into the judiciousness of the loan. He does not insist on the repayment of capital or interest till he finds that the margin of safety has passed. The rates of interest charged are high, compound and penal interest being the rule. Therefore when a ryot starts borrowing from a money-lender, he rarely improves his condition. Institutional credit is businesslike but cautious. In the present undeveloped state of the country and in relation to the poor credit-worthiness of the ryot, the village money-lender must be held to play a vital part in the economics of agriculture. Progress should be achieved by enhancing the credit-worthiness of the ryot by increasing his real income. This is a slow process, and calls for simultaneous development all along the line, but is a surer way of minimizing the debt burden than purblind restrictions on its availability.

Indigenous bankers

499. The indigenous bankers in this Province belong to certain communities like the Nattukkottai Chettiars, the Multanis, the Marwaris and the Kallidaikurichi Brahmans who carry on business with their caste *espirt-de-corps* at their back and with large funds of their wealthier members which are placed at their disposal at special rates and terms for use in business. They are of very ancient origin and their business as bankers with their instruments of credit, or ' hundis ' goes back to very early days in the history of India. So far as Madras is concerned, their operations are restricted to townsmen and trades people and financing of agriculturists is limited to a few mortgages of land. Curiously enough, the members of the well-known money-lending community, the Nattukottai Chettiars, do most of their business abroad.

Commercial banks

500. The part played by commercial banks in financing agriculturists is very limited. Their operations are limited to urban areas and whatever credit is extended to agriculture is confined to the marketing of the crop and to some of the bigger landholders on their personal credit. All over the world, commercial banks do not take any interest in financing farmers because agriculture is an occupation which is peculiar in itself and not comparable with other established manufacturing industries. [1] " Agriculture is a biological industry influenced greatly by climatic conditions, whereas industrial processes usually are unaffected by them. It is subject to the vagaries of weather against which the farming class for the most part are powerless. It works under conditions of uncertainty, and with many it is not so much a profession as a mode of living." This has attached a bad reputation to the ryot for dilatory and unpunctual habits in the matter of repayments of debts. This apart, these banks lack the expert knowledge required

[1] Report of the Committee on Co-operation in Madras, 1939–40, page 8.

for financing agriculture; to assess the value of the securities offered by the cultivators which are generally the land and the standing crops. Moreover, loans for improvements require financing over long periods and therefore ordinary banks cannot undertake the financing of agriculture.

Government agencies

501. The position of the *State* as a direct supplier of agricultural credit has always been insignificant. The amounts loaned are very small compared with the total requirements of the agriculturists. State credit has been mostly advanced to enable the ryot to tide over emergencies and are not intended generally to supply his normal finance. The Government cannot act as the regular supplier of normal finance to the ryot.

From early times, the Government have helped agriculturists by grant of loans under the Land Improvement Loans Act of 1883 and the Agriculturists' Loans Act of 1884. The Acts and the rules issued thereunder specify the purposes for which loans may be granted. Under the Land Improvement Loans Act, loans may be granted to landholders and cultivators for making improvements on land thereby adding to its letting value, viz., the construction of wells, tanks and other works, the preparation of land for irrigation, drainage and protection from floods and erosion, the permanent improvement of land or such other items of work which may be declared as improvements to land from time to time. The loans are granted by the Revenue department after local enquiry and are repayable by equal annual instalments discharging both principal and interest. The period by which a loan can be repaid is fixed according to the principal of the loan, but generally the maximum period does not exceed 20 years; in some exceptional cases, the period may extend to 30 years. The rate of interest charged on the loans was originally 6¼ per cent but has since been reduced to 5½ per cent. Under the Agriculturists' Loans Act short-term and medium term loans are granted to owners and occupiers of arable land for current agricultural purposes, such as the purchase of seed grain, manure and cattle and the rebuilding of houses destroyed by fire or floods. Loans are also granted for other agricultural purposes like purchase of fodder, purchase and erection of agricultural machinery and equipment like cane mills, irrigation mhotes or pump sets. For the relief of distress among cultivators in famine tracts, loans may be granted under this Act to cultivators up to a maximum amount of Rs. 200 until the ripening of the next harvest.

Under the 'Grow More Food' campaign, loans are now granted for land reclamation and improvement, free of interest for one year and thereafter at 3 per cent per annum. In some cases, small interest-free loans are also granted for the purchase of seed and manure.

502. An outstanding feature of these "Takkavi" loans is the low rate of interest. It is much lower than that charged by ordinary

money-lenders. The total number and amount of loans granted under these Acts, however, are very insignificant compared to the total requirements of the agriculturists. The loans are not popular with the cultivators owing to the delays and the irksome enquiries which follow an application, the insufficiency of the loans granted for the purposes for which they are required and the extreme strictness with which the loans are collected as arrears of land revenue. If these defects are remedied, these loans may become more popular and be of immense advantage to the large mass of small cultivators. In the administration of the loans also, better co-ordination than hitherto with the Agricultural department will make them play a more useful part in the improvement of agriculture.

Co-operative credit organisations

503. "The desirability of providing the peasant with some means of obtaining the capital required for agricultural operations otherwise than at usurious rates of interest had at various times engaged the attention of the Government and of all who were interested in promoting the welfare of the agricultural classes." In 1892, Sir Frederick Nicholson was placed on special duty by the Madras Government to enquire into the possibilities of introducing a system of agricultural or other land banks. Mr. Nicholson (as he then was) in his report, stated that the Madras ryot was bearing a heavy debt burden at high rates of interest incurred mostly for unproductive purposes. He suggested as a remedy the organization of systematic and stimulative forms of banking which would be of both educative value and financial help to the ryot. [1] He recommended the establishment of small, locally worked institutions on the lines of European village institutions which would satisfy the postulates of proximity, security, facility, excite local confidence and consequently draw in local capital, work cheaply, almost gratuitously and thus provide cheap credit, influence borrowers towards the true use of credit and watch the utilization of loans in accordance with contract, exercise educative influences in matters of thrift, association and self-help and develop high forms both of individual capacity, of public life and national character.

Though Sir Frederick Nicholson's report did not lead to any immediate action by the Government, the report together with his remarks in the report of the Indian Famine Commission of 1904, of which he was a member, led to the introduction of the co-operative movement into India with the passing of the Co-operative Societies Act X of 1904. The Act was designed to assist agricultural credit and to foster agricultural credit societies as distinct from agricultural banks. It was made clear by the Government that the object of the societies contemplated by the Act was "far more special and limited, that they would be small and simple credit

[1] Report regarding the possibility of introducing Land and Agricultural Banks into the Madras Presidency by Sir Frederick Nicholson, Vol. I.

societies for small and simple folk with simple needs and requiring small sums only and that their most useful form of business would be small loans for short periods with prompt recoveries." Between the years 1906 and 1911 there was in this Province a phenomenal growing in the number of societies. [1] The following figures show the progress made up to 1911-12 :—

Number of societies of all kinds		972
Number of members		66,156
Paid-up share capital	Rs.	7,52,000
Reserve fund	Rs.	2,97,000
Working capital	Rs.	74,64,000

504. As time marched on, experience indicated that the Act of 1904 was inadequate to meet the growing needs of the movement and it was replaced by Act II of 1912 which made provision for the formation of central credit societies and co-operative institutions of all types and for all purposes. In the initial stages, the Government helped to finance co-operative societies, but this soon ceased. The Madras Central Urban Bank was registered in 1905 to assist in the financing of co-operative societies. In 1909, two district central banks were formed. After 1912, central banks were formed in one district after another and individuals and societies were admitted as members. For the proper supervision of these societies supervising unions began to be formed and the Provincial Co-operative Union was registered in 1913-14 with the object of assisting co-operative work.

There have been four distinct phases in the development of the co-operative movement in this Province. The period from 1904 to 1917-18 was one of slow and steady growth. The next period of ten years after World War 1 witnessed general agricultural prosperity and a very rapid expansion of the co-operative movement. The number of societies of all kinds reached 15,238 with a membership of 974,999 in 1929-30. During this period, the Townsend Committee on Co-operation enquired into the condition of the movement and made its recommendations. The third period from the Wall Street crash of 1929 to the beginning of the World War II, witnessed the world-wide economic crisis and a crash in agricultural prices. It was a period of consolidation and reconstruction of societies resulting in a downward curve in the number and membership of societies. This period, however, witnessed the beginning and expansion of land mortgage banking and other non-credit activities. During this period, the Madras Co-operative Societies Act, 1932, was passed to remedy the defects noticed in Act II of 1912 (India). Co-operation had become a Provincial transferred subject under the Government of India Act, 1919, and each Province had power to pass its own Provincial

[1] Report of the Committee on Co-operation in Madras, 1939-40, page 13.

enactment. A separate legal enactment for regulating the working of land mortgage banks was passed in 1934. The last phase from the period of World War II is being run. To some extent it may be considered as a period of agricultural prosperity consequent on the increase in prices of agricultural commodities. The period is one of controls which has led to the development of co-operative consumer stores.

Co-operative rural credit organization—Primary agricultural credit societies

505. The rural credit society is organized on the collective guarantee of the agriculturists of a village for their own relief. Modelled on the pattern of Raiffeisen Societies, they have compact areas of operation, unlimited liability and limited dividends. Credit is obtained on the joint security of members. The members of these societies are generally confined to the residents of one village and the societies are managed on the democratic principle of 'one member, one vote.' The general body elects a 'Panchayat' in whom the executive administration is vested. From among the panchayatdars a President and a Secretary are elected. The President is also the ex-officio treasurer and the executive functions are carried on by the Secretary. The objects of these societies as set out in the model by-laws cover, in addition to the dispensing of credit, a wide variety of functions like purchase of domestic and other requirements and sale of agricultural produce of the members, purchase of implements, improvement of agriculture and generally encouragement of thrift, self-help and co-operation among the members. In practice, however, very little has been done in furtherance of the objects other than the dispensing of credit. This is due to the fact that credit is the prime necessity for the ryot, and credit business is easily managed compared to other more difficult functions like purchase and sale of produce. The working capital of the society consists of share capital, entrance fees, deposits and borrowings from members and non-members and loans from central banks. The statement in Appendix 27 shows the progress of primary agricultural credit societies during the last 25 years.

506. These societies constitute the bulk of co-operative organizations in the Province and the soundness of the co-operative credit structure ultimately depends upon the soundness of primary societies. A general idea of their working efficiency may be gathered from the percentage of overdues from members. During the severe economic depression, the overdues at one time worked out to 70 per cent of the loans. This was gradually reduced to 47·17 per cent in 1938–39. Since then, the overdues have been further reduced. In June 1945, it stood at 22·34 per cent. This was largely due to voluntary payments by members who took advantage of the favourable prices for agricultural produce and

lands as a result of the conditions created by the war. [1] The following statement shows the demand, collection and balance of principal due to agricultural credit societies during the past nine years :—

Year.	Demand.	Collection.	Balance.	Percentage of balannce to demand.
	RS.	RS.	RS.	
1936–37	3,09,76,472	1,27,72,636	1,82,03,836	58·76
1937–38	3,05,90,866	1,36,29,251	1,69,61,615	55·45
1938–39	3,61,06,528	1,90,74,354	1,70,32,174	47·17
1939–40	4,16,88,188	2,47,71,193	1,69,16,995	40·58
1940–41	4,18,75,264	2,55,75,244	1,63,00,020	38·93
1941–42	4,73,11,139	3,31,76,912	1,41,34,227	29·87
1942–43	4,99,75,776	3,91,40,844	1,08,34,932	21·68
1943–44	4,13,36,439	3,13,04,343	1,00,32,096	24·27
1944–45	3,87,16,866	3,00,66,297	86,50,569	22·34

The working efficiency of the societies is also indicated in the audit classifications made of the Primary Societies every year. [2] The audit classifications for the past eight years are tabulated below :—

Year.	Thoroughly good societies.	Societies with some defaulters and some mistakes in account.	All other societies that do not come under class 'D'.	Bad societies whose registration will be cancelled should they fall to come under class 'C' within two years.	Total.	ntage o to total.
	A	B	C	D		
1937–38	190	869	4,031	728	5,818	12·5
1938–39	227	892	4,015	650	5,784	11·2
1939–40	176	754	3,074	507	4,511	11·2
1940–41	156	596	2,602	368	3,722	9·9
1941–42	139	658	2,668	569	4,034	14·1
1942–43*	..	..	..	..		
1943–44	176	769	2,747	455	4,147	11·0
1944–45	173	943	3,242	563	4,921	11.4

* Figures for 1942–43 not available.
(Audited up to 10th October in each year.)

The proportion which the C and D class societies bear to the total number of societies classified is large.

507. According to the census report of 1941, there are in this Province 35,837 villages having a population of less than 5,000 for which there are only 10,792 societies, representing 30 per cent. The remaining 25,045 villages require co-operative credit societies to be organized. The number of credit societies has been practically stationary for the last ten years. Similarly, compared to the total number of 7,229,754 landowners and tenants, the total membership in agricultural credit societies was only 637,036 on 30th June 1945 or 8·8 per cent of the agricultural classes. Again, while the Madras Provincial Banking Enquiry Committee estimated the borrowings by ryots for cultivation expenses at Rs. 60 crores annually, the annual average amount of loans issued

[1] Administration Reports of the Registrar of Co-operative Societies, Madras, from 1936–37 to 1944–45.

[2] Administration Reports of the Registrar of Co-operative Societies from 1937–38 to 1944–45.

by village credit societies during the six-year period ending 30th June 1945 was only Rs. 165·30 lakhs. Co-operative institutions have thus touched only the fringe of the rural credit problem.

Central Banks

508. In the early days of the movement, co-operative societies were financed by their own deposits supplemented by small loans from the Government. It was very soon realized that these sources were inadequate to meet the demand for agricultural credit, and that loans from the Government could be only a temporary expedient. The need was therefore felt for an agency which could attract deposits from towns and employ them for primary societies. The Madras Central Urban Bank was registered in 1905 with a view to financing co-operative societies throughout the Province. But this one bank at headquarters proved inadequate and it was found necessary to decentralize the financing through the formation of District Central Banks. The first District Urban Bank came into existence in Salem in 1909 and this was gradually followed by the registration of other central banks. There are now 30 central banks distributed all over the Province. As a rule, each revenue district has one central bank, Vizagapatam, Kistna and Tanjore have, however, two banks each and East Godavari, four. The Madura-Ramnad Central Bank operated on the whole of Madura district and portions of Ramnad, but recently the area of operations of the Srivilliputtur Banking Union has been extended to the entire Ramnad district and the jurisdiction of the Madura-Ramnad Central Bank has been restricted to the Madura district, so that each of the two districts may have a separate central bank. The Coimbatore Central Bank serves both Coimbatore and the Nilgiri districts and the Kistna (Masulipatam) Central Bank has jurisdiction over four taluks of the Kistna district and the Bhimavaram taluk of the West Godavari district.

509. The central banks are of a mixed type having both societies and individuals as members. Their main function is to tap local money to finance societies within their area of operations. The working capital of the central banks is derived from their own share capital and reserve fund, deposits received from the public and loans from the Madras Provincial Co-operative Bank. Central banks are permitted to borrow up to 10 times their paid-up share capital plus reserve fund. They are required to maintain a certain portion of their deposits in liquid form to meet their deposit liabilities on due dates. [1] In 1944–45, the deposits with central banks stood at Rs. 717·20 lakhs. Loans are made available to primary societies at reasonable rates of interest. Their status can be judged from the fact that these central banks were able to raise sufficient funds from the Provincial Bank and the Imperial Bank to meet the increased demand for loans from consumers' societies,

[1] Administration Report of the Co-operative department for 1944–45 page 11.

which have expanded their operations due to war time controls. The loans advanced amounted to Rs. 1,634·74 lakhs in 1944–45 as against Rs. 1,151·01 lakhs in the previous year. Some central banks had even surplus funds invested in defence loans and similar guilt-edged securities. In 1944–45, all the central banks worked at a profit; their total profits amounted to Rs. 6·27 lakhs. Their collections of loans advanced were also good, the percentage of overdues being 6·99 which was the lowest in the history of central banks in this Province. The statement in Appendix 26 shows the progress made by central banks since 1920–21. In the words of the Committee on Co-operation in Madras, 1939–40, " The central banks have served their purpose of financing rural and urban societies and balancing their funds admirably well; they have mobilized local deposits and made them availabe to primary societies at reasonable rates of interest and have rendered great service in the organization of agricultural finance on co-operative lines; they have drawn into the movement a number of honorary men whose services have been invaluable to the progress of the movement; they have taken a genuine interest in the growth of the movement in their respective areas and in schemes of co-operative education and rural development generally; they have enlisted the sympathy of an increasing body of depositors and, as a rule, have justified the confidence which the depositors have reposed in them."

Apex bank

510. When central banks were formed in the district, the Madras Central Urban Bank naturally withdrew from financing societies in the districts. It happened that some central banks had surplus funds by way of deposits while others were in need of funds. The need for a co-ordinating agency was keenly felt. Therefore, as recommended by the Maclagan Committee on Co-operation, the Madras Central Urban Bank was converted into an apex Provincial Bank in 1917. Since 1919, the Provincial Bank became a Federation of Central Banks with some individual share-holders. The Provincial Bank acts as a balancing centre and generally controls the rates of interest at which the constituent central banks borrow and lend.

The financial structure of co-operative credit agencies is federal. The primary rural credit societies form the base. The primary societies are federated into central financing institutions or central banks. These are federated to the apex bank. Thus the position of the co-operative central financing structure in the Province at present is that of a loose federal type of banking organization; the Provincial bank and Central banks are independent banking units but are loosely knit together by ties of financial relations ".

Government control of rural credit

511. State action for the control of rural credit goes back to the time of Warren Hastings, when rules for the adjustment of debts

declared 37½ per cent on sums below Rs. 100 and 24 per cent on sums above Rs. 100 as the established interest rates. Prior to 1855, the rate of interest was fixed at 12 per cent in various regulations in Madras. In 1899, the Government of India amended the Indian Contract Act declaring void transactions brought about with undue influence and pressure, but the provision was hardly of any use to the ordinary run of agricultural debtors who had not the courage to sue a money-lender openly in Court. It was soon realized that "subordinate courts had no power to interfere with contracts solemnly entered upon, nor rate of interest could be reduced unless certain things could be proved." Consequent on the failure of this amendment to do much good, the Madras Government pressed the Government of India in 1906 for some legislation against exorbitant interest rates. Three methods were suggested, viz., limiting the rates of interest by law, embodying in the law the principle of 'Damdupat' and vesting power in the court to reopen accounts and determine the original principal, the last based on the principles accepted in the English Money Lenders' Act of 1900.

After much deliberation, the Government of India introduced in 1918 a measure called the Usurious Loans Act. The Act, as subsequently amended, gave additional powers to courts to deal in certain cases with usurious loans of money and kind. The courts could reopen the transaction, take an account between the parties and relieve the debtor of all liability in respect of any excessive interest. For various reasons, however, the Act did not prove of much use to the ordinary agriculturists. The provisions of the Act were not uniformly applied in this Province and were resorted to but rarely. The position of the ryots, bad as it was, was rendered much worse by the world-wide economic depression which commenced in 1929 and which became acute during the following five years. The problem of rural indebtedness became a matter of grave concern and Government action for the alleviation of the distress became urgent. The usual remedies for the protection of interests of debtors or for financial aid to them were inadequate to meet the situation as it developed during the period of depression. The Usurious Loans Act, the Insolvency Act, the Land Improvement Loans Act, the Agriculturists' Loans Act and the co-operative institutions were designed to meet a normal situation. They could not and were not intended to cope with a desperate situation and other remedies had to be devised to mitigate the burden of rural indebtedness.

Madras Debtors Protection Act, 1935

512. The Madras Debtors Protection Act, 1935, was the first legislative enactment intended for the protection of small debtors who had borrowed sums below Rs. 500. The main objects of the Act were to fix a reasonable maximum rate of interest and to secure as between certain classes of money-lenders and debtors an improved system of keeping accounts which would give the latter means of ascertaining periodically how their accounts stood and how they were composed. The maximum rates of interest 9 per

cent simple interest for secured loans and 15 per cent simple interest for unsecured debts were fixed by Madras Act IV of 1936. Under the Act, the creditor was required to render accounts to his debtor only if asked for by the latter and this proved to be a drawback. The penal provisions in the Act were not sufficiently stringent to bring about the desired result. The Act was not also devised specially for the solution of the problem of agricultural indebtedness.

Agriculturists Loans (Madras Amendment) Act, 1935 (XVI of 1935)

513. The Agriculturists Loans Act was amended by Madras Act XVI of 1935, to permit the grant of loans to agriculturists to enable them to discharge their debts. The object was to afford relief to agriculturists a substantial portion of whose liabilities was originally incurred during the period when prices were high, i.e., prior to 1932 and whom therefore the succeeding period of depression had hit hardest. Liabilities incurred on or after 1st January 1932 for the settlement or renewal of debts contracted before that date were, however, treated as liabilities incurred prior to 1932. The scheme was intended to help the small agriculturists owning landed property not over Rs. 5,000 in value. The loan required must wipe out the entire indebtedness of the applicant and at the same time the total debt must not be below Rs. 100 or above Rs. 2,000. The borrowers should possess security valued at 2½ times the loan to be granted. An essential feature of the scheme was the scaling down of the amount of debt legally due to a creditor. Special Loans Officers who were appointed to work the scheme were required not to settle a debt at more than twice the amount of the original principal or the principal plus 5½ per cent simple interest. whichever was less. In return for the cash payment to be made to the creditor the creditor was expected to accept something considerably less than what might be legally due to him. All creditors had to agree to take in full settlement of their claims the amounts fixed by the Special Loans Officers. If any one creditor refused, no loan was to be granted, and the application was to be rejected. The loan sanctioned was disbursed direct to the creditors. Under the Act, the Government advanced Rs. 1·68 lakhs during 1935–36, Rs. 16·85 lakhs in 1936–37, Rs. 7·41 lakhs in 1937–38, Rs. 0·52 lakhs in 1938–39, Rs. 1·20 lakhs in 1939–40, Rs. 1·22 lakhs in 1940–41 and Rs. 0·42 lakh in 1941–42. The relief afforded was infinitesimal and on account of the voluntary element in the scheme, it was not found possible to accelerate the disbursement of loans. In August 1942, the scheme was suspended for the duration of the War.

Madras Debt Conciliation Act, 1936

514. The Madras Debt Conciliation Act, 1936, provided for voluntary and amicable settlement of debts by bringing together

agriculturist debtors and their creditors through the medium of Debt Conciliation Boards constituted for the purpose. The Act applied to agriculturists whose debts exceeded Rs. 100. No creditor was to be allowed a greater amount in satisfaction of both principal and interest than twice the amount of the principal due and if the debt was incurred prior to 1st June 1933, twice the amount due on the said date. If the creditors to whom more than fifty per cent of the total amount of the debtor's debts was owing came to an amicable settlement with the debtor, it was recorded by the Debt Conciliation Board and registered and then it had the same effect as the decree of a Civil Court and was executable as such. If there was no settlement the application was dismissed but the Board might issue a certificate to the debtor that the offer made by him to any creditor was, in its opinion, fair. In such cases, the creditor was not allowed the costs of the civil suit, if any, filed by him subsequently or any interest on the principal amount due to him in excess of simple interest at 6 per cent per annum after the date of such certificate. The working of the Debt Conciliation Boards was by no means satisfactory as the creditors had been asking for their "pound of flesh". The Boards failed to achieve anything substantial by way of scaling down rural indebtedness and were abolished in 1942.

Usurious Loans (Madras Amendment) Act, 1936 (Madras Act VIII of 1937)

515. On a review of the working of the Usurious Loans Act, 1918, in this Province, it was found that the powers conferred on courts by the Act had not been utilized with any degree of uniformity, mainly owing to the fact that the powers conferred by section 3 were discretionary. The Usurious Loans (Madras Amendment) Act, 1936, was therefore passed to make the exercise of such powers obligatory on courts when circumstances required. The opportunity was taken to make it clear that relief should be afforded if the transaction as between the parties was substantially unfair and that such unfairness should be presumed if the rate of interest charged was found to be excessive. The presumption was made rebuttable by proof of special circumstances justifying the high rate of interest. Having regard to the fact that agriculturists were, as a class, unable to bear the burden of loans at compound interest, provision was made in the amending Act that if compound interest was charged on loans advanced to agriculturists, such interest should be presumed to be excessive.

Madras Agriculturists' Relief Act, 1938

516. A definite stage of advance in solving rural credit problems was reached when the Government, realizing the acuteness of the problem and the need for drastic remedies, considered that voluntary settlement should yield place to a compulsory scaling down of

rural debts. The Madras Agriculturists' Relief Act, 1938, was the result. It was intended to give relief to indebted agriculturists by scaling down their then existing debts, by reducing the rate of interest on their future debts and by writing off the arrears of rent due to Zamindars, Janmis and other landholders. Under the Act, the debts of the agriculturists were classified into two categories, namely, (1) those which were incurred before the 1st October 1932, and (2) those which were incurred on or after that date. In the case of the debts falling under the first category, all interest outstanding on 1st October 1937 was wiped out and only the principal or such portion of the principal as might not have been paid was payable. Where an agriculturist had paid twice the amount of the principal to his creditor by way of interest or principal or both, the entire debt (principal and interest) was wiped out. Where the repayments exceeded the principal but were less than twice the principal, only such amount as would be necessary to bring up the amounts repaid to twice the principal or such portion of the principal as was outstanding, whichever was less, was required to be paid. Where a debt had been renewed and a fresh document had been executed, only the principal originally advanced together with the sums subsequently advanced as principal was to be regarded as principal. As regards debts incurred on or after the 1st October 1932, the principal or such portion thereof as might be outstanding was not affected and had to be repaid. Relief was given only in respect of interest. The interest to be allowed was fixed at 5 per cent per annum simple interest. All payments made by agriculturists towards interest were to be deducted from the interest as so calculated and only the balance, if any, was payable by them. Any amount due under a decree which remained unsatisfied on 22nd March 1938, the date on which the Act was brought into force, was to be scaled down in accordance with the above provisions on the application of the agriculturist judgment-debtor. Proceedings in execution of a decree were required to be stayed on application until the decree was amended but the application for the amendment of the decree should be made within 60 days of the stay order. Where the immovable property of an agriculturist had been sold or foreclosed on or after the 1st October 1937, the agriculturist debtor was entitled to apply to the court within 90 days after the 22nd March 1938 for setting aside the sale or foreclosure of the property. In such cases the interest of the creditor was safeguarded by providing that alienations of immovable property made by an agriculturist debtor on or after the 1st October 1937 would be invalid against the creditor concerned. Where any movable property of an agriculturist had been sold on or after the 1st October 1937, the sale was to stand but the decree-holder was required to refund any sum received by him on or after that date in excess of the sum to which he would have been entitled, if the property had not been sold. The Act also prescribed the maximum rate of interest to be charged on debts incurred by agriculturists after it came into force at 6¼ per cent per annum simple interest. The

relief afforded to indebted agriculturists by courts under the Act during the period from 22nd March 1938 to 31st March 1946, was as follows :—

	RS.
Total amount involved in applications disposed of under sections 8, 9, 13, 19 and 19-A	9,63,43,014
Total amount scaled down	4,61,90,243
Total amount of reduction by scaling down debts and its percentage to the original amount due ..	5,01,52,771 61 per cent.
Number of cases disposed of	2,05,347

This excludes the reduction of debt secured by voluntary settlement of the parties without going to court.

517. As regards arrears of rent due to landholders or under-tenure holders under the Madras Estates Land Act or janmis or intermediaries under the Malabar Tenancy Act, the Madras Agriculturists' Relief Act laid down that all such arrears for fasli 1345 and earlier faslis should be treated as discharged, subject to two conditions, namely, (1) that the rent for fasli 1347 was paid on or before the 30th September 1938 and (2) that the rent for fasli 1346 was paid on or before the 30th September 1939. Where only a portion of the rent for fasli 1346 was paid before the 30th September 1939, the rent for fasli 1347 having been paid before the 30th September 1938, the arrears for fasli 1345 and earlier faslis were to be discharged only in the same proportion, as the rent actually paid for faslis 1346 and 1347 bore to the full rent due for those two faslis. Land cess recoverable by a landholder under the Madras Local Boards Act, land revenue and water-cess payable by the tenant and costs awarded in decrees for rent were not wiped out and the landlord was entitled to recover them in addition to the rent for faslis 1346 and 1347. All payments made by a tenant towards rent after the 22nd March 1938 were to be credited to the rent for fasli 1347 in the first instance and to the rent for fasli 1346 in the next instance. The tenant was also entitled to pay into court the amount considered by him to be due towards rent and ask the court for a declaration as to what amount was actually due from him.

Effect of debt relief legislation and future action

518. The Madras Agriculturists' Relief Act tended to curtail rural credit. The help that Land Mortgage Banks and Co-operative Credit Societies could give in that direction was limited. The bulk of the borrowers had to go to the private money-lender. He would not lend freely under the altered conditions and to satisfy him, various devices were adopted to circumvent the provisions of the Act. On account of their necessity, ryots were obliged to agree to the extra legal terms and conditions stipulated by the private money-lender. Fortunately there has been a welcome change during recent years as a result of the conditions created by the war. On account of the high prices for agricultural produce and considerable increase in land values in the wake of the war, the agriculturist has been

in a far better position than previously to discharge his debts. Consequently, there should have been a substantial reduction in agricultural indebtedness, though it is not possible to estimate the extent of the reduction.

519. So far, the control of rural credit by the State has been limited to meet the difficult situation created by the worldwide economic depression of the last decade. The various legislative enactments referred to earlier were designed to cope with an emergency and to that extent they may be said to have largely served their purpose. The lesson to be drawn from the past is that the conditions which rendered the emergency legislation inevitable should not be allowed to recur. Legislation can help only to reduce the ryot's debts but his small holding, the low yield of his crops, the vicissitudes of rainfall and many other factors which lead to his borrowing remain. The only method of breaking this vicious circle is to assist him to increase his net income by reorganizing agriculture on a profitable basis and to educate him in the cultivation of the saving habit and the avoidance of the evils of improvidence and extravagance. As part of this long range policy, it is also necessary to promote by permanent legislation a healthy relationship between debtor and creditor. Rural credit is not an evil when it is utilized for productive purposes. As recommended by several commissions and committees of enquiry, private money-lenders should be licensed and the reciprocal obligations of the lender and the borrower should be regulated by law in such matters as the rates of interest chargeable for different types of transactions, the regular maintenance of proper accounts, the supply of periodical statements of accounts to the debtor and the like.

Land Mortgage Banks

520. The agriculturist requires not only short-term credit to meet his current financial needs but also long-term credit for land improvement, redemption of mortgages on lands, discharge of other prior debts, and purchase of lands. The professional village money-lender generally extends credit only for short periods. From time immemorial, rural finance for long terms was entirely in the hands of the well-to-do agriculturists of the locality who advanced loans for long periods on the security of mortgages. But the rates of interest charged by them on such loans were high and the loans were not allowed to be repaid in instalments. The village co-operative credit societies are not in a position to supply the agriculturist with long-term credit as they are financed by District Co-operative Central Banks which depend for their funds on short-term deposits and it is not sound banking to utilize short-term deposits in long-term investments. Hence a separate financing agency was found necessary to raise long-term funds and to advance long-term loans at cheap rates of interest, and repayable in stated instalments. Accordingly, the Government sanctioned in 1925 the formation of land mortgage banks on a co-operative basis with power to

float debentures on the security of lands mortgaged to them by individual borrowers. The banks were based on limited liability and their area of operations was restricted to compact groups of villages to ensure intimate knowledge of borrowers and of the condition of lands offered as security. The maximum borrowing power of the banks was limited to 8 to 10 times their paid-up share capital and the maximum amount of loan to an individual member was fixed at Rs. 1,000. The loan should not exceed 50 per cent of the value of the mortgaged land. The banks were allowed to float debentures for 20 years at 7 per cent per annum and issue loans to their members for periods, not exceeding 17 years at 9 per cent per annum. The Registrar was appointed as the trustee for the banks for the due discharge of their obligations to debenture holders. In order to encourage the investing public to purchase the debentures floated by these banks, the Government undertook to purchase an amount equal to that to be issued to the public, subject to a maximum of Rs. 50,000 per bank and to a maximum of Rs. 2½ lakhs for the whole Province. The progress in the beginning was not up to expectations. Two land mortgage banks were registered in 1925 and 10 banks by 1927. Only three of these banks could find purchasers for their debentures. It was realized that the existence of a number of independent banks issuing different series of debentures militated not only against the success of the debenture issue but also against the whole scheme. The position was examined by the Townsend Committee on Co-operation in 1927–28, and it recommended the formation of a Central Land Mortgage Bank for the centralized issue of debentures and for financing primary banks. The Madras Co-operative Central Land Mortgage Bank, Limited, was accordingly registered in December 1929. Membership is open both to individuals and primary land mortgage banks. The capital of the Bank is Rs. 20 lakhs made up of 20,000 shares of Rs. 100 each. The administration of the affairs of the Bank is vested in a Board and subject to the control of and delegation from, the board. in an executive committee. The Registrar of Co-operative Societies who is the trustee of the Bank is an ex-officio member of both the Board and the executive committee. The Bank raises funds mainly by the floatation of debentures up to 25 times its paid-up share capital *plus* reserve fund. It may with the permission of the Registrar as trustee, issue debentures of one or more denominations, on the security of the mortgages executed by the borrowers in favour of primary land mortgage banks and assigned to it by them, and of its other assets. The total value of the debentures in circulation at any time should not exceed the total amount due on the mortgages, the amounts paid thereunder and remaining in the hands of the Board or the trustee. The debenture-holders have a floating charge on all mortgages assigned in favour of the bank and the Registrar as the trustee has to see that the Bank fulfils its obligations to the debenture-holders. All the mortgages and other assets transferred by primary banks to the Central Land Mortgage Bank automatically vest in the trustee. The powers and functions of the

trustee are governed by an instrument of trust executed between the Bank and the trustee. In order to make the debentures trustee securities and for certain other purposes, the Madras Co-operative Land Mortgage Banks Act, 1934, was passed enabling the Government to guarantee the principal of and the interest on the debentures issued by the Central Land Mortgage Bank. The guarantee given by the Government at present extends to debentures up to a maximum of Rs. 350 lakhs, exclusive of the value of such debentures as may be redeemed by the Bank from time to time. Under the Indian Trusts Act, as amended in 1934, these debentures are included in the list of trustee securities. The bank now floats debentures for 20 years at 3 per cent, interest being payable half yearly. The debentures up to and inclusive of the XXIII series are redeemable to the extent of annual collections under principal from primary banks. As this detracted from the popularity of the debentures among long-term investors, the debentures issued in the XXIV and subsequent series have been made irredeemable for the first ten years from the date of their issue. For the amortization of these debentures, the Bank has constituted a sinking fund by setting aside and investing every year out of its realizations a fixed sum which, with compound interest at an assumed rate, will yield at the end of the period for which debentures are issued an amount equal to that which has to be repaid. It has also created a special reserve to meet any unforeseen losses arising from bad debts. With a view to conserving the resources of the Bank, 40 per cent of its annual net profits is allocated to its statutory reserve fund and the dividend on share capital is limited so as not to exceed by more than one per cent the rate of interest at which debentures are floated.

521. There are now 119 primary land mortgage banks. All of them are affiliated to the Central Land Mortgage Bank. The jurisdiction of a primary bank has been gradually extended and it is now generally a revenue taluk. Membership is open to persons owning agricultural land in the area of operations of the bank. The maximum amount which a bank can borrow at any time is limited to 20 times its paid-up share capital and reserve fund. Loans are issued to members for redemption of mortgages, for discharge of prior debts not secured by mortgages and for improvement of land and methods of cultivation. The by-laws also provide for the grant of loans for purchase of land in special cases so as to enable the ryot to round off his holding and work it more economically. The maximum amount of loan to any one member, originally fixed at Rs. 1,000 has been gradually raised and the limit now may go up to Rs. 15,000 in banks situated in deltaic and other areas having assured irrigation facilities. The loans are secured by first mortgages on lands and do not exceed 50 per cent of the market value on the pre-war basis. The lands mortgaged are revalued once a year but as an emergency measure revaluation is now done biennially. The rates of interest charged on loans by primary banks

have varied according to the conditions of the money market and the rates at which debentures have been floated from time to time. The Central Land Mortgage Bank at present floats debentures at 3 per cent and lends to primary banks at 5 per cent. The latter charge interest at 6 per cent on loans to their members. Thus a margin of 3 per cent is maintained between the borrowing rate of the Central Land Mortgage Bank and the lending rate to the individual borrowers, of which 2 per cent is retained by the Central Land Mortgage Bank and 1 per cent by primary banks. Land Mortgage Banks now form an integral part of the Co-operative Credit System in Madras. The following statement shows the progress made during 1944–45 :—

	Central Land Mortgage Banks.	Primary Land Mortgage Banks.
Number of banks	1	119
Membership	591	83,684
	RS.	RS.
Share capital	11,07,200	18,93,496
Loans from other societies.	2,49,148	2,26,68,671
Loans from Non-members.	3,02,12,500	21,000
Reserve fund	12,23,058	5,43,776
Other funds	2,62,743	85,696
Total working capital ..	3.44,98,650	2,52,12,638
Profit	2,83,639	1,11,714
Loss	..	22,475

522. At present the jurisdiction of all the primary banks covers 18,375 villages and loans have been granted in 6,471 villages. Since the inception of the Central Land Mortgage Bank, loans were issued to the extent of Rs. 4,13,54,800 out of which a sum of Rupees 1,87,27,477 was repaid, leaving a balance of Rs. 2,26,27,323 outstanding from primary banks on 30th June 1945. On account of the conditions created by the war there was a large inflow of advance collections and decline in the business of land mortgage banks during 1942–43 and 1943–44 but there was an appreciable increase in the loans disbursed in 1944–45. Advance repayments have also shown a decided fall. If these trends persist, there is plenty of scope for the development of land mortgage banks and their loan transactions. Though they should continue to apply themselves to the task of granting long-term loans for redemption of indebtedness, the time has come when these banks should also encourage loans for productive investment on land improvements.

Other forms of co-operation

523. Co-operative organizations have been built up for many purposes other than agricultural credit. In a previous chapter on marketing the growth of co-operative organisations relating to marketing of farm products like agricultural produce, milk and other livestock products has been given together with a review of the working of consumers' co-operatives. Apart from these,

co-operative organisations in this Province extend to varied activities touching upon many aspects of rural and other social problems. They may be broadly classified as Agricultural and non-Agricultural societies. A brief account of the working of the more important types of agricultural societies is given in the following paragraphs.

Agricultural Improvement Societies

524. Agricultural Improvement Societies have been formed with a view to demonstrating to the ryots improved methods of cultivation. They attend also to seed multiplication and distribution of improved varieties of seed. They give expert advice to cultivators and act as liaison agents between the ryots and the Agricultural department. There are 65 Agricultural Improvement Societies with a membership of 6,200 and a paid-up share capital of Rs. 7·79 lakhs. The Lalgudi Sivagnanam Agricultural Society in the Trichinopoly district is the earliest and most prominent among societies of this type.

Land reclamation societies

525. A scheme for the reclamation of land in the Cauvery-Mettur Project area in the Tanjore district is worked through Co-operative Societies. Ten such societies have been newly formed. One labour co-operative society has also been organized to encourage labourers to undertake reclamation work. Further, six old societies have amended their by-laws to enable them to issue loans to members for undertaking reclamation work. On 30th June 1945 there were in all 14 societies with a membership of 1,154 and a share capital of Rs. 6,438. The Government have provided Rs. 75,000 during 1945–46 for the grant of loans through these societies for reclamation work.

Colonisation societies

526. The object of colonisation societies is to encourage the educated unemployed in the country to take up agriculture as an occupation. Two such societies were organized in 1937 and some more societies were gradually added. They were not successful to any marked extent. The societies started for the educated unemployed by the Annamalai University was a failure. In 1940, the Government considered the promotion of agricultural colonization, to prevent land grabbing by the rich and the influential, and to afford greater facilities to the landless poor to obtain land. It was represented that a good deal of the land assigned in the past to the landless had found its way into the possession of rich or influential neighbours. It was therefore decided that a special attempt should be made to ensure that land was assigned to the

really poor and was retained in their enjoyment. To this end it was proposed that land assignment should be made not to individuals but to groups of colonists formed into co-operative societies. Accordingly assignments were made of compact blocks, each block to one co-operative society. The main objects of these societies are—

(1) To hold land from the Government, divide it according to a scheme of colonisation approved for the purpose and distribute the holdings among the members;

(2) to arrange for the reclamation of the lands, if necessary, and to ensure their cultivation;

(3) to purchase or own implements, machinery and cattle for hire to members; and

(4) to borrow funds from Central Banks or others on the security of the lands assigned to them and grant loans to members for agricultural expenses, including reclamation of lands.

527. The land assigned is held on ryotwari tenure by the society which will be responsible for paying the assessment and water-cess due to the Government, as well as the taxes payable to local bodies. The Government reserve the right to resume the lands without compensation and to re-enter the lands or any portion thereof in case of breaches of the conditions of assignment or default in the discharge of financial responsibilities. The members of the society are chosen from persons with an agricultural bias and resident in the village in which the lands are situate. The Government contribute a sum of Rs. 10 to each colonist as a free gift to enable him to take one share in the society. He is also given financial assistance through co-operative banks and by the Agricultural department for seed, implements, cultivation expenses and cattle. Each member is bound by the conditions laid down in the by-laws of the society and will have occupancy right in his holding, so long as he cultivates it, pays his dues and carries out the instructions of the society as regards the cultivation of the holding. If he fails to abide by these conditions and is consequently expelled from the society or if he relinquishes his holding, the lands in his enjoyment may be transferred to a fresh member. A member will have no right to sublet or mortgage or otherwise encumber his holding. The holding will also be impartible and will on the member's death pass on undivided, along with the member's interest in the society, to his nominee or failing a nominee to his senior male heir; failing such heir, it will revert to the society. Valuable lands are not given free though the full value may not always be levied. The amount to be charged is usually settled, so as not to exceed a sum which the member should normally be able to pay in twenty annual instalments, taking into account the net income that he may be expected to derive from cultivation. In cases where the land has to be reclaimed, the assessment will be waived for the first few years,

not exceeding five. In cases in which such a concession is considered to be necessary water-cess also will be waived in full for the first year of irrigation and levied at half rates for the next one or two years and at full rates thereafter. The area granted to each colonist is not in all cases sufficient in itself to support a family, but it is expected that the colonists will work also as agricultural labourers in the neighbourhood. Technical help to the colonists is given by the Agricultural and Co-operative departments. Land colonization schemes are now functioning in North Arcot, Chingleput, Coimbatore, West Godavari, Kistna, Kurnool, Salem and Tanjore districts. In 1945, there were 28 colonization co-operative societies with a membership of 3,257 and each of them was in charge of an Agricultural Demonstrator. Two thousand six hundred and sixty-six members were active colonists. Out of 10,470 acres of land assigned to these societies, 7,893 acres have so far been reclaimed by the members.

Kudimaramat and irrigation societies

528. Kudimaramat and irrigation societies are formed to undertake kudimaramat work by the removal of silt and maintenance of irrigation channels in repair. Societies for this purpose have been organized in the districts of South Arcot, Tanjore, Tinnevelly, Guntur and Kistna. There are 15 societies in the Province with a membership of 1,741 and a paid-up share capital of Rs. 5,292. The area brought under cultivation by them by affording irrigation facilities was 5,060 acres; 1,910 members were thereby benefited. Wherever they have been started, they are doing useful work, though to a great extent their work is handicapped due to non-co-operation from non-member pattadars. An extension of these societies to deal with distributary channels in deltas and under irrigation tanks will greatly help in the proper maintenance of the irrigation systems.

Cattle breeding societies

529. Cattle breeding societies are organized in selected localities to improve the ryot's agricultural stock. There are 14 such societies. The Anchetty Cattle Breeding Society in the Salem district and the Sugalimeta Cattle Breeding Society in the Kurnool district maintain 8 and 3 stud bulls, respectively, and the number of superior calves produced by them is 326 and 142, respectively. The Kangayam Cattle Breeding Society at Tiruppur which was started during 1944–45 registers animals of Kangayam breed with the aid of the Veterinary department with a view to helping the owners in finding a profitable sale for the animals. The society registered up to the end of the year 179 cows and 16 bulls.

Sugarcane growers' societies

530. Sugarcane growers' societies have been formed in pursuance of a scheme intended to help sugarcane growers to obtain fair

prices for their produce. The main features of the scheme are the employment of co-operative and agricultural staff to assist societies and unions of sugarcane growers in factory areas and the grant of a cash subsidy to the societies for the purchase of seed, manure and implements. The scheme is financed mainly from the sugar excise fund. There are 12 Sugarcane Growers' Co-operative Societies and 5 unions working in the Province. A contribution of Rs. 1·50 lakhs from the sugar excise fund was spent on the scheme over a period of 5 years and the scheme is being continued from provincial funds in the districts of East Godavari, South Kanara and Coimbatore. The societies are helping the factories to get adequate supplies of cane for crushing and are thus playing a useful role in increasing sugar production. There are also two co-operative sugar factories, the Coimbatore Co-operative Sugar Manufacturing Society and the Ettikopaka Co-operative Agricultural and Industrial Society. During 1944–45 the Coimbatore Society crushed 129,175 cwt. of cane and produce 9,298 cwt. of sugar and the Ettikopaka factory crushed 9.044 tons of cane and produced 874 tons of sugar.

Fruit growers' societies

531. There are 19 fruit growers' societies. They help the members in marketing their fruit and in obtaining reasonable prices for it. They also advance loans to members for their cultivation expenses. The Kodur Fruit Growers' Society in the Cuddapah district which is the biggest in this class has 1,398 members with a paid-up share capital of Rs. 48,918. The society sold fruits valued at Rs. 39·82 lakhs in 1944–45. It has its own sales depots at Hyderabad, Bangalore and Cuddapah. At Madras, its fruits are marketed mostly through the Provincial Marketing Society. The Palacole Fruit Growers' Society in the West Godavari district is next in importance. Its sales in the year 1944–45 amounted to Rs. 3·61 lakhs.

Weavers' societies

532. The most important co-operative organizations of the cottage industries type are the weavers' co-operative societies which have been organized to provide yarn or small cash advances to weavers and for the sale of finished cloth produced by them. The first society was started in 1905 in Conjeevaram and more societies were organized in other places from time to time. On account of various reasons such as the vested interests of master-weavers, indebtedness among weavers and the difficulty in selling the products, these societies have had a chequered career. The crux of the problem has been marketing and arises from the fact that mill-made cloth governs the price of all other cloth. The societies therefore confined their activities to credit business till 1935 when the handloom industry received an impetus under the Government

of India subvention scheme. In the same year, the Madras Handloom Weavers' Provincial Co-operative Society was formed,

(1) To arrange for the purchase of raw materials and appliances necessary for the affiliated societies and their sale at reasonable prices;

(2) to arrange for the sale of finished goods of the affiliated societies; and

(3) to give financial and other help to the societies.

Since the formation of the Provincial Society there has been a steady development in the number, membership paid-up capital, number of looms, production and sales of weavers' societies and the war has given a further fillip to these societies. The membership of the Provincial Society includes individual weavers' societies, co-operative Banks and spinning mills. The societies purchase yarn from the Provincial Society and distribute it to weaver members specifying the varieties of cloth to be produced. The weavers are required to hand over the cloth and the marketing is done by the Provincial Society. The Provincial Society has a large number of emporiums and sale depots all over the Province through which sales are effected. It is running three weaving factories with a view to evolving new designs and manufacturing improved varieties of handloom fabrics to suit the changing tastes of the people. It has also three dye factories to ensure supply of coloured yarn to primary societies and an up-to-date screen printing factory at Madras for printing of cloth, sarees, chintz, and door-curtains. The number of weavers' societies on 30th June 1945 was 311 with a membership of 51,131 and 26,936 working looms. Their paid-up share capital was Rs. 10·26 lakhs and the value of cloth produced and sold was Rs. 169·54 lakhs and Rs. 174·44 lakhs, respectively. The Madras Handloom Weavers' Provincial Society had a membership of 618 and a paid-up share capital of Rs. 1·40 lakhs. The value of yarn supplied by it to primary societies was Rs. 79·51 lakhs and its purchases of finished goods from them amounted to Rs. 15·62 lakhs.

Better living societies

533. Better living societies are intended for reforming bad social customs, preventing waste of money on festivals, marriages and funerals and inculcating habits of thrift. Such societies are popular in the United Provinces and in the Punjab. There are only 53 better living societies in Madras and their progress is rather slow.

Cottage industries societies

534. For a long time Co-operative Societies confined themselves to giving loans to members engaged in cottage industries. The first attempt at organising production on co-operative lines was made with the weavers' societies. In 1927, the Government ordered a

survey of important cottage industries by a Special Officer. As a result of the survey a few co-operative societies for cottage industries were organized at different centres. On account of the war, there has been a shortage of several consumers' goods and this has led to the development of cottage industries on a co-operative basis. [1]The following statement shows the progress made by cottage industries of diverse types during 1944–45.

Type of society.	Number of societies.	Number of members.	Value of goods produced.	Value of goods sold.
(1)	(2)	(3)	(4)	(5)
			RS.	RS.
Egg Production and sale societies ..	15	844	6,867	7,757
Women's cottage industries societies.	29	1,232	5,303	5,120
Jaggery production societies	77	3,023	51,856	55,148
Cigar manufacturing societies ..	3	264	75,919	62,658
Oil production societies	1	115	5,508	3,996
Lace work societies	1	67	540	210
Dhall manufacture societies	2	35	878	868
Butter supply societies	7	115	392	2,919
Ghee production societies	9	634	26,364	45,006
Toy manufacture societies	3	81	7,055	6,686
Malt manufacture societies	1	19	329	299
Coir making societies	7	1,438	6,359	4,165
Pottery societies	6	259	10,761	11,667
Handmade paper societies	7	433	6,585	3,793
Stone carving societies	1	38	884	888
Charcoal production societies ..	5	197	28,251	24,263
Bee keeping sale societies	10	462	606	596
Mat making societies	6	329	16,228	16,382
Leather goods societies	7	774	89,820	82,117
Metal work societies	4	276	7,305	7,466
Bell metal work societies	3	86	932	920
Basket makers' societies	2	58	57	22
Other cottage industries societies ..	4	260	154	84
Total ..	210	11,039	3,48,953	3,43,030

Societies for Scheduled Castes

535. On account of the socio-economic disabilities from which members of the scheduled, backward and similar classes suffer, it was found necessary to start separate societies for these classes. In 1915, there were only 6 societies but with the organization of the Labour department in 1920, there has been a considerable expansion in the number of societies formed exclusively for these classes. The societies are intended for various purposes like supply of credit for agricultural and domestic expenses, purchase of house-sites to provide dwelling houses, taking of land on lease

[1] Administration Report of the Registrar of Co-operative Societies, 1944–45.

or on assignment from the Government for purposes of cultivation. A separate financing agency called the Christian Central Co-operative Bank functioned from 1916 till 1939 when it was liquidated. The financing of these societies has since been taken over by the district Central Banks. A special staff of Co-operative Inspectors is employed at the cost of the Government for the intensive supervision of these societies and for assisting them in the collection of dues and writing up of accounts. [1]There were 2,246 scheduled caste societies including Kallar and Fishermen societies at the end of 1944–45 with a membership of 1·03 lakhs. Their transactions are given below :—

	RS. (IN LAKHS.)		RS. (IN LAKHS).
Paid-up share capital ..	5·84	Overdues to Government ..	0·57
Deposits of members ..	1·10	Reserve fund	5·46
Loans from central banks ..	5·59	Working capital	19·38
Loans from Government ..	1·39	Divisible profit	0·49
		Loss	0·63

The greatest obstacle to the sound development of co-operative credit among the scheduled classes is their poverty and want of assured means to repay their debts.

Future credit organization

536. The credit structure of agriculture is seen to consist of the village money-lender, the indigenous bankers and commercial banks, the Government and co-operative societies including land mortgage banks. It is significant that except the village money-lender and the co-operative societies others have complementary rather than competitive functions though a certain amount of overlapping is inevitable. Agricultural operations are financed by the money-lender and the Co-operative Credit Societies. The indigenous bankers and the commercial banks confine their operations largely to lending on produce. Co-operative Sale Societies also play their part at this stage. The short-term Government loans are confined to the purchase of agricultural implements, cattle, seed and the like. Long-term loans for the discharge of prior debts are provided by Land Mortgage Banks.

537. The role of the village money-lender has already been discussed. He will continue to perform a useful function till the ryot's economic position and general education improve. His is not theoretically an equitable share but the classical economists would consider a great part of the interest payment taken by him as coming under the risks of the trade and not as pure interest. As long therefore as the ryot remains poor and credit is necessary for agriculture, the mere starting of co-operative

[1] Administration Report of the Registrar of Co-operative Societies, 1944–45.

institutions will be inadequate to solve the problem of financing agriculture. Commercial banks and private bankers may hereafter play a larger part in giving produce loans. There is already a tendency for even the more conservative banks to expand their business in this direction. The limitation on business of this type is mainly due to the absence of storage facilities and of standardized grades of produce. Every improvement in these directions will increase credit worthiness and ultimately even out the price level between one season and another. It will also lead to a reduction in rates of interest. The same applies to co-operative sale societies. In fact, between the stage of the harvest and the actual marketing, the sale societies will have to play a more and more important part in the future.

538. The co-operative credit structure has no doubt made appreciable progress but there are two lines on which improvement is desirable. The first relates to the period for which the loans are given. The second relates to the finance available to the societies themselves. While there is provision at the present time for purely short-term as well as purely long-term credit, medium-term credit has not been properly studied so far. A seed loan can generally be paid off by the ryot at the end of one season. A loan for wiping off prior debt can be paid off by the ryot annually in a period of 10 or 15 years. But a loan for the purchase of cattle or for the digging of a well cannot be paid off in a very short period and at the same time can be paid off earlier than 10 years. Loans which can be repaid over four or five annual instalments have to be encouraged. It is here that the second difficulty mentioned above, namely, the finances available to the societies requires adjustment. The deposits of the members available to primary societies are inconsiderable. They depend for their finance mainly on loans from Central Banks. These Central Banks are situated in urban areas and attract deposits for short periods. The percentage of such deposits that can be locked up for more than one or two years is small. Consequently the ryot very often borrows for what may be called a medium-term purpose but has to repay over a short period. This goes against the general principle of a productive loan, namely, that it should be paid from out of the income realized by the work done with the help of the loan. Whether medium-term deposits can be attracted by Central Banks at suitable rates of interest is a point for careful examination. A revision of loan policy even with the existing resources so as to make provision for such loans can certainly be considered even at present.

539. In addition to this the primary societies themselves require to be strengthened. At present they are being treated with parental care and with the usual restrictions that a careful parent imposes on children. The Government are afraid that some of them might fail. The primary societies are therefore not allowed to utilise their reserve funds in their own transactions. These funds have to be

deposited in the Central Bank. It is therefore not to be wondered at that the primary societies rarely attract deposits. A bolder approach towards strengthening the societies would be to select some of the better societies and to allow them to utilize their reserve funds for loan purposes. Many years ago the Maclagan Committee observed that if the funds of the society are lent out to the members in the village then every depositor would be a sentinel on the transactions of the society. The utilization of the Central Bank funds for loans in the village leads to a slight feeling of irresponsibility, and the risks attendant on the funds of the society being used for loans in the village are ultimately less than the demoralization involved in continually drawing funds from elsewhere for disbursement to borrowers. Further, the unlimited liability society is suitable only for a small and homogenous village community. With the improvement in communications and the consequent ease with which a villager can travel a distance of more than 20 miles and back within a forenoon, there is need for making a group of villages, the unit for a Co-operative Bank of the limited liability type. This experiment should be tried in a few of the more advanced areas such as the deltaic tracts. It is necessary to impress on the villagers the business side of the bank more than the beneficient side.

CHAPTER XII—EDUCATION

540. In this chapter a brief survey of the present educational system is made with a view to finding out how far that system has contributed to raising the general standard of literacy and education in the Province and has helped to equip the masses for social and economic reforms along modern lines. The importance of a sound educational system which will progressively raise the standard of literacy of the citizens and thus fit them to take an active part in all nation-building activities need hardly be stressed. Associated with this, is the value of technical and higher training which gives leadership in all such activities. Apart from moulding the national outlook of the present generation, the educational system also aims at deciding the pattern of the coming generation. It has been accepted on all sides that the system of education to be aimed at must be to guarantee, as far as possible, a certain minimum equipment to the whole population. This minimum equipment must be of a fairly high level so that the ordinary citizen will be capable of understanding and appreciating the issues submitted to his judgment. The higher the degree of literacy attained by the people, the greater the possibility of the Government by the people being conducted on sound foundations. When the country's economic organization becomes more diverse, the educational system also must provide facilities for the development of such varied activities. There are thus two aspects to educational reform—(*a*) mass literacy and (*b*) orientation with an eye to general civic equipment and leadership.

The beginning of modern education

541. Modern education had its beginning in the year 1813 when an annual allotment of one lakh of rupees was provided by a somewhat reluctant Court of Directors of the East India Company, in accordance with a clause in the Act of that year which renewed the charter, for the "revival and improvement of literature and encouragement of the learned natives of India and for introduction and improvement of a knowledge of the sciences." The Committee of Public Instruction appointed for spending the allotment functioned for some ten years. Certain centres of culture like the Sanskrit College of Benares were founded with due respect for indigenous culture and prejudice. However, it was only in 1835 that any beginning was made for the promotion of English literature and science. Indian leaders of the time like Raja Ram Mohan Roy gave considerable support to this movement which resulted in the famous minute of Lord Macaulay on the Education of India. Sir Charles Wood's despatch of 1854 was a landmark in the development of modern education. The despatch stated that the main object of the educational system introduced in India was to spread western knowledge

and science with desirable encouragement to Oriental learning at the collegiate stage and that both English and "Vernaculars" should be used as media for instruction at the secondary stage. As it was anticipated that the Government would not be able to finance the whole scheme, it was left to private bodies like Missionaries and others, to provide the bulk of educational institutions. The despatch added that the efforts of the Government to educate a few should cease and that the education of the masses must be regarded as the primary responsibility of the State. As a result, educational departments for the control and promotion of education were created. From 1854, education in India meant a system of schools, colleges and examinations, ultimately controlled by the Government. The administration of education in the Provinces was subject to the general control of the Government of India up to 1920. During this period many institutions were maintained from public funds, managed by the Education Department and staffed by teachers who were Government officials. Another class of institutions was maintained and managed by local bodies subject to close control and supervision by the Government. The third class under the management of private agencies like local committees or private proprietors depended on the Government for recognition and grants-in-aid. By 1921–22, there were in India a total of 182,442 institutions maintained by the Government and non-Government bodies.

Literacy

542. The following table shows the progress of literacy in British India during the last 60 years:—

Year.	Population (lakhs).	Per cent increase.	Literacy (lakhs).	Percentage of literacy.	Per cent increase.
(1)	(2)	(3)	(4)	(5)	(6)
1881	1,947	..	68c	3·5	..
1891	2,130	9·4	98c	4.6	1·1
1901	2,207	3·7	117c	5·3	0·7
1911	2,317	5·0	126s	5·4	0·1
1921	2,336	0·8	148s	6·3	0·9
1931	2,569	10·0	179s	6·9	0·6
†1941	2,958	15·1	..	..	..
Average ..	..	7·3	..	..	0·68

* Excluding Burma.

† The total literacy figures are not available but it is stated in the census for 1941 that for the whole population of India there is an increase in literacy of 70 per cent, over the 1931 census.

· Based on statistics contained in "Literacy in India" by R. V. Parulekar.

s *Ibid.*, page 16. These figures exclude Burma.

The progress of literacy in this Province has been very slow. The growth of population during this period was 7·3 per cent whereas literacy increased only by 0·68 per cent. According to the census report of 1931, only 16 per cent of the males and 2½ per cent of the females were literate. For English literacy, the figures were 2¼ and ½ per cent. There is considerable variation in the number of literates from district to district. The largest number of literates, more than one among four, is found in Madras City. In the mufassal, the districts of Malabar, Tanjore, Tinnevelly and Ramnad have

the largest number of literates with 2,200—2,500 male literates per 10,000 of male population. Trichinopoly, Madura and South Arcot come next in order with a range from 1,800 to 2,200. Omitting the Agency tracts, literacy is poor in the Chittoor and Nellore districts where only 600 to 1,000 males are literate out of every 10,000; in other words, 9 out of every 10 persons are illiterate. For literacy among female population also, the order of the districts is nearly the same. Malabar has the largest number of female literates compared to any other district in the Province. The over-all progress of literacy in Madras is indicated in the following statement:—

Year.	All ages—Literates per 1,000.	
	Total population.	Females.
1901	63	9
1911	75	13
1921	86	21
1931	92	26
1941	130	63

The over-all progress in literacy during the four decades represents a 100 per cent increase over 1901 but the substantial increase is during the last decade from 1931 to 1941 when the number of literates increased by over 53 per cent.

Primary education

543. The history of primary education also dates back to Sir Charles Wood's despatch of 1854 referred to earlier. Up till then, the East India Company had regarded any direct attack on the problem of mass education as an impossibility. They considered that the only means of reaching the masses was by educating the literary classes and letting education " filter down " through them. The Secretary of State confirmed the policy as outlined in the despatch of 1854 and advocated the adoption of further steps for the promotion of primary education which included the levy of a special rate on land to provide funds for financing vernacular education. All subsequent changes in the policy of primary education are but developments of the general policy then laid down.

544. With the appointment of Directors of Public Instruction in all Provinces, there took place a rapid growth in the number of schools all over India; some were government institutions, others private aided or unaided. But during this period far more interest was taken in the promotion of secondary education than primary. In 1871, the control of the education departments was made over to the provinces with a fixed allotment from central revenues. In 1882, an Education Commission was appointed to review the progress of education since 1854. Primary education was put in the forefront of the terms of reference. The Commission recommended that the elementary education of the masses, its provision, extension and improvement required " strenuous efforts of the

State in a still larger measure than hitherto." The recommendation of the Commission had a great effect on subsequent Government policy relating to expansion of primary education and its management by local bodies set up under the Local Self-Government Acts of Lord Ripon's Government in the years 1883–1885, the development of the grant-in-aid system, and the stimulation of private enterprise. The next forward step in the primary education policy was made by the Government of India Resolution of 1904 which declared that primary education had received insufficient attention and an inadequate share of public funds and that "primary education should be made a leading charge on provincial revenues." The first popular attempt for the extension of elementary education was made by the late Mr. G. K. Gokhale, who introduced into the Imperial Legislative Council in 1911, a bill for the extension of elementary education which would have made compulsory primary education "permissive", that is, subject to the consent of the local authorities and the Provincial Governments. The bill was circulated and discussed in 1912. The Government opposed the bill on the ground that there was no popular demand for the measure, but the Government spokesman hinted that the proper course would be the introduction of measures of compulsion through Provincial legislatures. In 1913, the Government of India again reviewed its educational policy by a resolution. The main feature relating to primary education was that "it refused to adopt the principle of compulsion in primary education for financial and administrative reasons, but re-affirmed the necessity of directing the energies of the State and the bulk of its available resources on the improvement and expansion of primary education." For providing more competent teachers, the resolution insisted on the importance of improving and multiplying the middle vernacular schools and giving proper training to teachers. Many of the educational developments anticipated in the 1913 resolution were delayed owing to World War I. In 1920, Education became a transferred subject. Under dyarchy, the first landmark in primary education in this Province was the passing of the Elementary Education Act, 1920. By this Act, District Educational Councils were created and they became the statutory agencies for developing elementary education in the Province. They functioned till 1939 when they were abolished. It was found that they did not work very satisfactorily and that there was no justification for the existence of a third authority besides the Government and local bodies. In the place of the District Educational Councils, an Advisory Committee for each taluk was constituted in all districts except Madras. These committees consisted of members who by their position in life and intimate knowledge of local conditions would be of real help in advancing the cause of education in the taluk. The Taluk Advisory Committees were also abolished in July 1944 as experience of their working for nearly five years had shown that they were not serving the purpose for which they were brought into existence. The Act of 1920 also provided for the constitution and control of an elementary education fund which was to be raised by an educational tax

in a notified area not exceeding twenty-five per cent of the taxation leviable in that area under the law for the time being in force governing municipalities under all or any of the following heads, viz., property tax, tax on companies and profession tax. If the area was outside a municipality, a tax was to be levied not exceeding 25 per cent of the taxation leviable in that area under the law for the time being in force governing local boards under all or any of the heads; viz., land-cess, profession tax and house-tax. It was also provided in the Act that the Government would contribute a sum not less than the proceeds of the taxation raised in the manner mentioned above. The most important provision in the Act was the power given to local authorities for the introduction of compulsory education within a specified area for all children of school age.

545. It was observed within a very short time that the progress and expansion in elementary education was only in quantity and not in quality. There was too much of wastage and stagnation. Large numbers of elementary schools were uneconomical, ineffective and in many cases superfluous. Many of the schools which were in existence for several years were found to be making little or no contribution to literacy. In 1936, out of a total number of about 42,600 lower elementary schools, only 7,160 were complete with five standards and as many as 8,300 had only standards I to III or less. Over 18,600 lower elementary schools were working only with one teacher and nearly 12,000 lower elementary schools had less than 30 pupils on their rolls. As a result, a very large number of pupils never reached the higher standards and consequently left school without attaining permanent literacy and the stagnation of pupils continuously in the lower standards was very marked. The figures for boys' schools alone for the five-year period between 1930–31 and 1934–35 showed that out of a total of 1,165,000 pupils on the rolls in standard I, only 101,000 reached standard V and over 700,000 pupils failed to attend Standard II after spending one year in Standard I. It was found that large numbers of pupils were reading in the lower elementary standards at an age when they should have already completed the primary course. There were approximately half a million over-aged pupils reading in the first five standards of elementary schools. The position indicated a great waste of public funds in educating children who never attained permanent literacy. The Government went into the question in detail in 1936 with a view to reorganizing the whole system of elementary education and to preventing this waste. They took steps to improve the structure both of aided elementary schools and of local board elementary schools and amended the rules framed under the Elementary Education Act, with a view to preventing ineffective expenditure of public funds on aided elementary schools. The policy and the means directed towards this end were set forth in the press communiqué of the Government of Madras issued on the 8th December 1936 in the following words:—

"The policy of Government in future will be to see that as far as possible only complete primary schools with five standards are supported by subsidy or aid, an exception being made in the

case of feeder schools with two or three standards which can be proved to be regularly passing on their pupils to the higher standards of neighbouring complete schools. This new policy will ensure that all pupils entering primary schools will at least have the opportunity of completing the full primary course and of attaining permanent literacy. The new rules framed under the Elementary Education Act will prevent aid being given to schools with a total average attendance of less than 25, thus withdrawing support from manifestly uneconomic schools; will insist on a proper distribution of pupils between standard and standard, schools which cannot show a reasonable proportion of their total strength in Standards IV and V being penalized by a cut in grant-in-aid; and will insist on managements employing a reasonable proportion of trained teachers.

"Government have further decided that in order to ensure that the Rs. 2 crores of public funds which are annually spent on elementary schools in the Province are spent effectively, a mere alteration in the general policy and a change in the rules framed under the Elementary Education Act are not sufficient. They consider that it is of the greatest importance to maintain both a well-trained and contented class of elementary teachers and a supervising inspecting staff strong enough and competent enough to secure a strict adherence to rules by managements and to prevent the waste of public funds on inefficient and irregularly working schools. . . Government have therefore decided to raise the scales of grant for trained teachers in aided schools. Their intention is gradually to reduce the number of untrained elementary teachers and discourage the further training of teachers of the lower elementary grade. They do not intend therefore to alter the scales of grant for these classes of teachers. They do intend, however, to raise the scale of grant for higher elementary trained teachers and for secondary grade trained teachers.

"After a careful examination of the position, Government have come to the conclusion that one of the main causes for the inefficiency of a large number of elementary schools and for the irregular working of large numbers of schools and consequently for a large waste of public funds on such schools has been the inadequacy of the inspecting staff and the absence of frequent surprise and supervising visits by the subordinate inspecting officers. Government have also come to the conclusion that the superior administrative staff is inadequate and not strong enough to ensure that the very large sums of public money spent on elementary education are spent effectively. They have therefore decided to find funds for a considerable increase in the Inspecting Agency and have sanctioned a scheme. . .

"The new rules framed under the Elementary Education Act have been designed to improve the efficient working of aided schools. Government have not, however, overlooked the necessity for simultaneously improving the condition of local board elementary schools. The new standard to be aimed at will be insisted on

both in the case of aided schools and in the case of local board schools and all the local board presidents have been informed accordingly. The Presidents of all District Educational Councils have also been advised to withdraw recognition from ill-working board schools. The increase in the inspectorate sanctioned by Government will make it possible for the Education Department to have a closer supervision over the working of local board schools and Government are taking the necessary steps to see that the new policy of maintaining only complete and economically filled aided schools is applied to local board schools also. The detailed scrutiny of the condition of mass education in the Province has revealed the fact that in certain localities there is undesirable competition between aided schools and board schools, and while it is Government's intention to eliminate inefficient and unnecessary schools irrespective of the agency managing the schools,, it is also Government's intention to adhere to its policy of not allowing board schools to be opened in competition with efficiently working and longstanding aided schools.

"While attempting to improve the efficiency of elementary education, Government have not failed to recognize the fact that the syllabuses of study both in elementary schools and in training schools must be in keeping with the new aims of elementary education and must in particular be suited to the needs of the large number of pupils who will return to village conditions of life after the completion of the elementary course. To this end, Government have already appointed a committee which is engaged in revising the syllabuses both for lower elementary and for higher elementary schools. Government have simultaneously taken up for consideration the revision of the courses of training for elementary and secondary grade teachers with a view to making them more professional and practical than they are at present. They have further decided to make provision for the organization of refresher courses in suitable local centres in order to make the existing trained teachers better equipped for meeting demands which the new revised syllabuses will make on them.

"Government are hopeful that with the introduction of a new policy, with the provision of additional funds for raising the pay of teachers and for paying full grants to efficient elementary schools, with the strengthening of the controlling agencies and the subordinate inspecting staff, rapid improvement in the efficiency of elementary education will result. Government are also hopeful that the large sums of public money now being spent on elementary schools will be spent less wastefully and more effectively and that the schools themselves will show a much better return by way of a rapidly increasing output of permanent literates."

The hopes of the Government that the introduction of the new policy would result in the rapid improvement in the efficiency of elementary education were fully justified. A very large part of the increase in literates of 53·3 per cent for the Province in the census decade 1931–41 is largely due to this policy. The very

first improvement noticed was the increase in the percentage of pupils in Standard V as compared with the number in Standard I from 9·5 per cent in 1938 to 36;9 per cent in 1944, as shown below :—

—		1937–38.	1938–39.	1939–40.	1940–41.	1941–42.	1942–43.	1943–44.
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
Boys' schools	..	9·5	22·3	25·8	29·0	32·3	35·7	36·9
Girls' schools	..	9·9	17·4	20·8	25·2	30·0	33·0	33·7

One of the aims of the department is that at least 25 per cent of the number of pupils in Standard I should be in Standard V, in order to ensure that pupils who are enrolled in schools are retained till they complete the school course and thus become permanently literate. This aim has now been attained. The distribution of pupils in the five standards of the elementary schools also shows considerable improvement.

Progress of elementary education

546. There were in the Province 36,399 elementary schools for boys and girls with a total strength of 2,980,743 pupils in 1944 compared with 33,378 schools with 1,434,126 pupils in 1919–20. Thus it is seen that though the number of institutions has increased only by about 3,000, the number of pupils studying has doubled indicating a higher proportion in attendance per school. Of these 36,399 schools, 31,406 were complete schools with five standards including 1,678 higher elementary schools with standards above the fifth. Of the rest, 639 had Standards I to IV only, 1,133 had Standards I to III only, 485 had Standards I to II only and 26 had only the first standard. Among these, there were 1,100 feeder schools with standards up to the third or below, which were recognized as such, subject to the condition that they passed on every year at least half the number of pupils from their highest standard to the next higher standard in a neighbouring complete school. The remaining incomplete schools were all practically new schools opening higher standards annually in the process of becoming complete schools. It can thus be claimed that the aim of the Government policy set forth in their Press Communiqué of 8th December 1936 has been largely achieved by the end of 1942, both in respect of the structure and efficiency of elementary schools.

Provision of schools in rural areas

547. The following table shows the provision of schools in rural areas in 1937 and 1942, and the percentage of villages with one or more schools to the total number of villages with a population of :—

Year.			1,000–2000.	500–1,000.	200–500.	Less than 200.
(1)			(2)	(3)	(4)	(5)
1937	..	..	93	81	42	18
1942	..	..	99	83	55	

There were 41,128 schools in 1937 as against 33,689 in 1942. Though the number of schools has decreased, their distribution

is more even. In the villages with a population of 1,000–2,000, the percentage of villages with schools has risen from 93 to 99 and in the 500–1,000 population group, the percentage has increased from 81 to 83. In other words, there is only one village out of every 100 with a population range of 1,000–2,000 which has no school and there are 17 villages without schools in the 500–1,000 population group of villages. It is only in villages with a very small population that the number of schools is not adequate. Otherwise, the distribution of schools in rural areas must be considered generally satisfactory.

Primary education in relation to rural life

548. From the very inception of mass education, the Government and educationists have contributed their thought and experience to the improvement of primary education to make it more and more attractive and useful to the rural population and give it a rural bias. In 1927, the late Sir Meverel Statham, in his report on Elementary Education in this Province, attempted to indicate the manner in which the instruction given in elementary schools should be adapted to the conditions of rural life. He stated : " If a wide expansion of elementary education is merely going to increase the tendency for the youth of the country to desert the villages for the towns and congest the already over-crowded callings which require higher educational qualifications, it had better not be undertaken." He added that, " it is true that an expansion of elementary education must rightly and naturally give ultimate opportunities of higher education to many who are now denied them, but the primary object of expansion should be the amelioration of the condition of village life." He suggested that the village school must be considered as a fountain-head of rural welfare and not merely as a medium for removing illiteracy. The lessons on rural science, health and hygiene must be imparted in such a way as to make them practised in the daily life of the village. The village school must be made a centre for a library, adult education, lectures on health, hygiene and first-aid. By adopting all these methods, the village school must be made a vital force in the rural life of the village and the training imparted must be one directly connected with rural life. With this end in view, the late Sir Meverel Statham suggested the project method of instruction. The progress in this direction was not very successful, though several attempts were made to modify the curricula of studies in the elementary and higher elementary schools to suit rural environments. This was mainly due to the inability of the poorly paid, ill-qualified village schoolmaster to understand and appreciate the conditions of rural areas and requirements of the rural school children and until better trained teachers are made available, progress in this line will be necessarily slow.

549. The question of a rural bias in elementary education again came up for discussion by the Committee on Higher Elementary Schools in 1932. The Committee found that many of the higher

elementary schools which were originally intended as purely rural institutions to serve the needs of a rural population had become gradually imitation middle schools providing a type of education distinctly unsuited to a large majority of pupils. The Committee recommended the appointment of better qualified teachers and an alteration in the courses of study in the training schools for teachers. They were of the view that a mere alteration of the curricula of studies would not produce the results required, unless the teachers were so trained that they would impart the necessary bias whether rural, industrial or vocational in their teaching. The Committee observed that many of the pupils in elementary schools approached the subject of study as if they were isolated or mysterious quantities of knowledge to be painfully acquired. In practice, with a little conscious effort on the part of the teacher it should be perfectly simple to make the pupils not merely interested in their studies but alive to the fact that the acquisition of knowledge can be intimately related to the every day happenings of life in their home surroundings. "The proper way to relate the work done in an elementary school to the surrounding conditions of life is to give instructions in the subject set for study in such a manner that the young pupil will be able to learn his nature study, geography, mathematics and civics not from text books alone but from an interest in and an understanding of local industry and trade, the working of local administration, local agricultural operations, local communications and transport, the work of co-operative societies and the local conditions of sanitation and public health. Such a method of study presumes either actual observation of the various activities referred to or the reproduction in miniature in class room or compound of the various activities going on in the neighbourhood of the schools." With this object in view, the Committee recommended that prevocational instruction should be given in all higher elementary schools. The Government in considering these recommendations and enunciating their educational policy, stated :—"One of the causes of unsatisfactory progress is the unsuitability of the curriculum in elementary schools and the absence in many cases of proper methods of teaching. The scheme of studies for elementary schools is not sufficiently related to the life and surroundings of both parents and pupils. This is particularly so in the case of rural elementary schools. If the village school is to be of real value to the village children and to the surrounding rural life generally, the teaching imparted in the school must be directly related to the realities of life in its environment. The stereotyped methods now generally employed by schoolmasters, many of whom do not belong to rural areas, tend to make study in the school something foreign and extraneous and therefore something difficult and uninteresting to the majority of the pupils. The teaching of nature study, for example, from a text book without its being in any way related to the actual life in and around the school is of no practical value. There is little or no training in the powers of observation, hardly any practical work, and no interest is taken in gardening. The teacher usually tends to

divorce the pupil from village life and hereditary occupations rather than help to train up better villagers. The unsuitability of the present curriculum is also evinced by the fact that the most important subjects such as hygiene, civics and practical instruction are now only optional subjects. The reorganization of the courses of study in elementary schools naturally necessitates a reorganization of the work done in the training schools. What is especially required is that educated villagers should be trained in rural bias so as to make the imparting of knowledge a living thing in relation to every day happenings in village life." Therefore the Government concluded that the " project " method of teaching in elementary schools was the most suitable one, particularly for rural schools. In order to frame a curriculum more suitable for elementary schools, the Government set up a special Committee to draft detailed syllabuses for each standard of elementary schools. In order to ensure a greater correlation between the training course in training schools and the work, particularly of the village teacher, the Government ordered that the courses in training schools should also be fundamentally revised. The curricula of studies for lower and higher elementary schools submitted by the Committee appointed for the purpose were approved by the Government and introduced in all elementary schools in 1939–40. Among the special features of the new curriculum is the compulsory instruction in one or more handicrafts in lower elementary standards and at least one pre-vocational subject in higher elementary standards. Practical subjects of daily utility such as hygiene and gardening for all pupils, needle craft and home science for girls and the recreative subject of music for both boys and girls are also included among the compulsory subjects. To cater to special local needs, a group of optional subjects which include English, first-aid and a second or local lauguage in bi-lingual areas or Muslim schools has also been provided for. As many as 23 handicrafts and 32 pre-vocational subjects have been provided for. They include many popular ones such as spinning and weaving and many specially suitable to rural areas such as mat weaving, bee-keeping and pottery, besides subjects particularly suited to girls such as needle work, embroidery and lace-making and preserving and pickling. The details of the courses of studies have been planned with much thought and attention to the practical needs of the rural population. Emphasis has been laid on problems relating to cultivation, household and farm accounts, safety instruction and elementary first-aid, civics, silent reading and letter-writing in language and practical gardening in nature study.

Compulsion

550. The total population of the Province is near 50 millions and the number of children of school-going age is estimated at about 7¼ millions. At present the total number attending schools is nearly 3 millions, leaving a balance of 4¼ million children who

are not attending schools. It is estimated that there are approximately 1,936,000 boys and 2,327,000 girls of school age not attending school. Mention has already been made of the Government of India's Resolution of 1914 in which the principle of introducing compulsory primary education was reviewed and given up for financial and administrative reasons. The Madras Elementary Education Act, 1920, provided for the introduction of compulsion under certain conditions for both boys and girls. Compulsion has since been introduced in 27 municipalities and in select rural areas in three taluks of Malabar, Sivakasi in the Ramnad district, Saidapet in the Chingleput district and in the Tiruvadi Union of the Tanjore district. In 1934, the Act was amended in order to enable the Government to take steps not only to introduce compulsion generally for all children of school age but also compel a parent who had once admitted his child to school to continue that child in school until the child had completed the elementary course or had passed out of the age limit for compulsion. An examination of the statistics for the compulsory areas indicated that the success or failure of compulsion considerably varied in different localities in which it had been in operation, but it clearly revealed that in no area had the application of compulsion succeeded in eliminating wastage or in obtaining a proper distribution of pupils between standards. After careful examination, the Government came to the conclusion that in many cases preparation for the introduction of compulsion had been insufficient. Provision for the required number of school places, adequate staff and equipment and more particularly for complete five standard schools had not been made. The Government reviewed the position in 1937 and felt that the improvement of schools on the lines indicated earlier was of more immediate importance than a rapid extension of compulsion and that the provision of complete properly staffed and adequately accommodated schools must in future be an essential precursor to the introduction of compulsion. They therefore considered it best to extend compulsion gradually in the Province after improving the average elementary school and with adequate provision in the rules for making sure that compulsion would be legally enforced. Another unsatisfactory position was that compulsion was not applied to the areas where there was the greatest difficulty in attracting children to, and retaining them in, the school. In many cases, compulsion was applied to municipal areas and an examination of the figures of school attendance and literacy show that it is in rural areas, particularly where groups of backward communities and scheduled castes live, that the enforcement of compulsion is likely to be the only ultimate means of ensuring that children actually attend and remain at school for the full primary course. An analysis of literacy statistics shows that there is wide disparity between male and female literacy. In any extension of compulsion, the position of girls should necessarily, as a matter of broad policy, receive greater attention than in the past.

Women's Education

551. Twenty-five years ago, only 1·8 per cent of the female population attended school in the Madras Presidency as against 4·6 per cent in 1942. This unsatisfactory position continued for so long as compulsion was practically excluded from all schemes of women's education. Moreover, the staff for the schools mainly happened to be men. Now, women's education has considerably improved. A drive in this direction was initiated in 1936 by requiring that in existing boys' schools in areas where there are no girls' schools, 25 per cent of the girls in the local area must be in attendance at school and that in new boys' schools in such areas at least a third of the strength should consist of girls. The number of girls receiving instruction in elementary schools touched the figure of 1,151,186 in 1942 as against half a million, two decades ago. In 1942, girls reading at the secondary school stage totalled 73,799 and girls undergoing university courses numbered 2,110. Women's literacy in the decade 1931–41 increased from 2·5 to 6·3 per cent. "Women's education is the condition on which ultimately the success of male education depends, the fundamental basis of any real and permanent regeneration of Indian national life." The need for a rapid development of women's education in India is now generally recognized. If women are educated, their influence in the home will give greater stimulus to education. There are certain professions where women can play a more useful part than men. In professions like medicine and nursing the need for educated women is urgent. The war has shown the scope for the employment of women in various avocations. The recent Madras University Committee for the Reorganization of Education in the Province has expressed the opinion that in the future, primary education will largely be undertaken by women teachers; so also in the sphere of secondary education for girls. The main difficulties which have stood in the way of development of women's education have been (1) a definite hostility to the education of girls among certain sections of the community; (2) indifference to the education of their daughters on the part of parents who are not definitely hostile and (3) dearth of well-qualified women teachers and women inspecting officers. The first two difficulties are partly due to the general feeling that marriage and motherhood is the chief, if not the only career for women and that the education of girls should be limited to this objective. These views are changing but very gradually.

Buildings and equipment

552. Suitable buildings and equipment are important requisites for proper education. The Elementary Education Manual lays down that the buildings used for the school shall be suitable, shall admit sufficient light and air and shall be kept clean. Judged from these standards, the general position with regard to accommodation in the form of building and equipment for many schools in this

Province continues to be unsatisfactory. Even in the old established Board and Municipal schools with substantial buildings of their own, the increase in strength has rendered the accommodation inadequate and the possibility of extension is remote for want of funds. There are exceptions in many districts in the case of aided schools, which have successfully obtained local support for improving their accommodation. The following statement gives some idea of the provision of buildings for elementary schools in the Province in 1942.

——	Total.	Own buildings.	Rented buildings.	Chavadis.	Dwelling houses.
(1)	(2)	(3)	(4)	(5)	(6)
Government ..	1,526	748	668	110	..
Municipal	975	477	493	5	..
Local Board ..	12,351	3,339	8,263	730	19
Panchayats ..	1,379	1,040	247	89	3
Aided	17,366	12,013	4,047	1,075	231
Unaided	92	68	16	7	1
Total ..	33,689	17,685	13,734	2,016	254

The fact that more than two-fifths of the schools are accommodated in rented buildings many of which are obviously unsuitable for school purposes and a small percentage in dwelling houses which are still more unsuitable, indicates the need for a much further advance in the matter of accommodation for elementary schools. In regard to equipment in elementary schools, commendable progress has been recorded in many districts following the introduction of new syllabuses which explicitly specify the requirements in connexion with most of the general knowledge subjects. In the matter of school museums, many managements have still to realize their educational value. Ill-assorted collections of grains and toys and odd pieces of handiwork of pupils are all which the so-called museums contain in many schools. As regards provision of gardens for elementary schools, the general position is satisfactory. The Elementary Education Manual provides that at least a small garden must be maintained in every school. If sufficient space is not available, managements may apply for alienation of public land for raising a garden. Almost every elementary school has its garden or at least its window boxes and potted plants where there is no soil for a garden. Some of the gardens are, however, seasonal and in some places the rocky nature of the soil, scarcity of water and the ravages of animals militate against their maintenance in a permanently flourishing condition.

SPECIAL EDUCATION

Muslim Education

553. Owing to the backwardness of the Muslim community in South India in general and of the Moplah community on the West Coast in particular, special measures for the encouragement of Muslim education are being adopted. These measures include the provision of separate educational institutions, the provision of

reserved scholarships, fee concessions, and special facilities for language and religious instruction. There are 4,517 elementary schools in the Province intended for Muslims of which 630 are specially intended for Muslim girls. The number of pupils in all these schools in 1942 totalled 437,084. That these measures have been to some extent helpful in advancing the education of the community is shown by the fact that the figures both of enrolment of Muslim pupils in schools and of literacy among Muslims have considerably improved in the last few years. It may be observed that 14·9 per cent of the Muslim male population and 5·7 per cent of the Muslim female population are under instruction. These are slightly higher than the corresponding figures for the Hindu population. The figures of literacy show that the percentage of Muslim male literates to the total population is 19·2 and is considerably higher than the figure of male literates in all communities, namely, 16·1 per cent. However, literacy among Muslim women is poor compared to all communities.

Education of Scheduled castes

554. Much has been done in recent years by the Government to advance the education of pupils belonging to the scheduled castes. Steps have been taken to ensure that schools under public management are in places accessible to these castes and aid is withdrawn from aided schools which do not admit scheduled caste pupils. At the same time, owing to the backward state of the community, special schools have been opened in many areas both by the Government and other agencies. By 1944, there were 6,139 institutions mainly intended for scheduled castes with a total strength of 336,699. The total number of scheduled caste pupils in all the elementary schools of the Province was 725,587. One of the duties of the Commissioner of Labour is to assist progress in every way possible amongst the scheduled castes. Special scholarships and fee concessions have been provided and no fees are levied at certain public examinations. In some areas, midday meals, clothes, books and slates are provided free and the Government maintain or support a number of hostels for scheduled caste students. Scholarships are also provided and seats reserved for them in training institutions. The activities of the Labour Department are concerned mainly with—

(1) the opening and maintenance of schools;

(2) the provision of scholarships, stipends, boarding grants, and grants for the purchase of books and payment of fees;

(3) the maintenance of free hostels at important centres; and

(4) the grant of financial assistance to private associations engaged in maintaining hostels, boarding homes and schools for the benefit of the eligible communities.

As a matter of general policy, the Labour Department endeavours, as far as possible, to get pupils of scheduled castes admitted into the general elementary schools already existing in the locality.

But in places where owing to caste prejudices, the existing schools are not easily accessible to them, or where there are no schools whatever, new schools are opened. There were 1,125 such schools maintained by the Labour Department with a total strength of 56,170. One appreciable feature in these schools is the increasing number of admissions of girl pupils. Out of a total of 56,170, 18,518 were girls, thus contributing to nearly one-third of the total strength of the schools. In spite of all these facilities the progress of literacy among scheduled castes is poor. The percentage of literacy is as low as 1·5 and among women 0·1. There are certain occupational and other reasons why it is difficult to improve rapidly the education of this community. The great majority of their children are employed daily for agricultural and domestic purposes. They have at a very early age a potential wage-earning capacity. The Government have issued instructions that the difficulties of such families should be met as far as possible by a careful adjustment of school hours and school days, making it possible for the children to spend at least a portion of the day under instruction. The Government have also ordered the re-arrangement of school vacations in rural areas so that during busy seasons, like harvest time, the schools may be closed.

555. Educational facilities for backward classes like the aboriginal, hill and criminal tribes have also been provided in the Province. In 1942, there were 184 elementary schools for the hill and aboriginal tribes in the Agency tracts. The number of pupils belonging to these tribes reading in all the schools was 3,281 boys and 1,230 girls. For the Chenchu children in the Kurnool district, there were 23 elementary schools. These schools are located around the Nallamalai hills and are managed by the Collector. In addition to normal education, the pupils are taught some handicrafts. They are also provided with midday meals, clothes, books and slates. Periodical medical inspections are also conducted. Two hundred and ninety-eight elementary schools were exclusively maintained for the criminal tribes.

The Fisheries Branch of the Department of Industries and Commerce is conducting special schools for fisher-children with a view to creating in them a bias for fish industry on scientific lines. In 1942, there were 49 such schools on the West Coast with a total strength of 4,148 boys and 2,825 girls. There is a Fisheries Technological Institute at Tuticorin, which provides for the training of teachers in fishing technology after their regular training in ordinary teachers' training schools. It also provides courses of instruction to fishermen and others interested in different branches of the fishing industry including navigation.

Adult Education

556. With the onward march of democracy, the literacy of the individual citizen is assuming more and more importance. Apart from this, the illiteracy of the parent results in the illiteracy of

the children as well. The 1931 census disclosed the percentage of illiteracy among adults to be 77 for men and 97 for women. Since 1923, the Madras University has arranged for University extension lectures to be given in several centres by professors and prominent professional men. Apart from being academic lectures, these have not been of much use to workmen or the peasant farmers. The Y.M.C.A. has organized an "Adult Education Series" which consists of talks and debates on moral and religious subjects. Since 1937, the Government have taken up this question seriously. Many of the institutions for adult education in the Province are really adult literacy centres and not institutions for the education of adults who are illiterate. As a rule these institutions have not been very successful. In a few cases in which these have been successful, the progress is due to the amenities provided for members, who are already literate, like libraries and reading rooms or as, in the case of the Deodhar Malabar Reconstruction Trust Adult Education centres and to other benefits such as entertainments, magic lantern lectures, agricultural demonstration and advice. Where literacy alone is the aim, the institutions have not thriven. The Committee on the post-war educational reconstruction was of the view that the policy of the Government in recent years to concentrate on attempting to get every boy and girl to school and keep them there until they are permanently literate, would go a long way to make every body literate in course of time. They added: "It cannot be denied that, with sufficient finance and with power to compel the illiterate adults to attend a sufficiently long period of schooling, better results might be obtained, but in view of the large programme of work and the large initial expenditure facing the Province in connection with post-war education, a wide-spread system of so-called adult education does not appear to be called for." The Committee concluded by saying that it was essential to develop as widely as possible, a system by which real adult education might be provided for in the sense that children who had already left school should not only be prevented from lapsing into illiteracy but should be, whatever their occupation, provided with opportunities for further study. Part-time education must be provided with the help of all existing organizations, libraries and Universities. University extension work, adult education centres and all educational institutions must be utilized for the purpose. Similarly, the extensive use of the radio and the cinema for education must be of very great help to the movement.

Library Movements

557. There has been a progressive increase in the number of reading rooms and public libraries in the Province. In 1932, there were 770 public libraries and the number increased to 1,340 in 1944. Of these, over a thousand are maintained by local bodies. The number of books and journals in the libraries totalled 891,889 and

over 2¼ million persons made use of them as against 1¼ millions in 1932. The progress during the decade must be certainly considered encouraging. The Province has also 1,636 reading rooms and literary associations with a membership of nearly 2¼ millions.

Vocational Education

558. " The existing system of education in India has been carried on for generations with the main object in its lower stages. of securing permanent literacy in the mass of the population, and in its higher stages, of continuing the literary type of Education with little direct regard to the need of industry and commerce." This outlook in education has so much crystallized in the minds of parents that any change in the methods can be accomplished only with great difficulty. The tendency in this Province has been to resort to higher education without considering whether it is possible for its products to be absorbed profitably and without difficulty or delay, into the economy of the country. This tendency for higher arts education is also to some extent due to the assumption that " education for work in industry or commerce, excepting in the higher degree courses in professional colleges, is necessarily on a lower plane than is literary education, since it is concerned with material things; while literary education, being concerned with things of the mind, aims mainly at giving students, an acquaintance with the best that has been known and said in the world and thus with the history of the human spirit ". This, however, is based on wrong notions of the functions of education. The problem of vocational education is complex in that if any student who follows a vocational course of instruction and equips himself for a career in a particular industry fails to get a particular occupation within that industry, he will not only be disappointed but actually discontented. The solution of the problem lies in analysing and classifying the main activities of industry and commerce and drawing up of a course of vocational education with the greatest common measure of utility. Whatever it is, there is now considerable enthusiasm in favour of the swift evolution of a widespread system of vocational education amongst advanced thinkers and educationists. The keen desire for a more prosperous India, and the belief that better and adequate provision for vocational education would lead to the further industrialization of the country, have contributed to this enthusiasm. The Government of Madras considered this problem in 1937. In outlining their educational policy, the need for reconstructing the secondary education course in this Province was stressed. In this Province there is practically no secondary course complete in itself leading to vocational training or direct occupation. The Government considered this position and felt the need for effecting several changes in the secondary school system, one of which was the provision of a variety of courses at the high school stage. One of the reasons for the steady upward flow of high school students into universities is the fact that practically all high schools in the Province

prepare their students for a University education. In the early stages of educational development, this was not altogether undesirable since higher education attracted comparatively few students and clerical and professional employment absorbed the products of higher education. To-day, however, the continued existence of a rigid single type of secondary school cannot be justified. In other countries, where education has spread rapidly, various grades of secondary schools catering to the needs of various classes of pupils with different futures before them have come into existence and therefore the Government felt strongly that a similar line of development was called for in the Province. The position was strengthened by the Universities Conference of 1934 which stated that " a practical solution of the problem of unemployment can only be found in a radical re-adjustment of the present system in schools in such a way that a large number of pupils shall be diverted at the completion of their secondary education either to occupations or to separate vocational institutions. This will enable Universities to improve their standard of admission." Taking all these into consideration, the Government in 1937 came to the conclusion that it was desirable to institute in this Province a post-primary four-year middle school course followed on the one hand by a three-year selective pre-University course and on the other hand by bifurcated courses of varying types and length. A public examination is to be held at the end of Form IV. This will have dual functions and dual standards. On the results of the examination, pupils will be carefully selected for admission into the pre-University classes and pupils will also be selected with a different standard to enter the post-middle school vocational classes. It is thus intended to divert students from going to the Universities long before the matriculation stage, and to encourage large groups of students to select courses of study not leading to University entrance but preparing for types of employment which do not necessarily require University degrees. The courses of study to be included are Secretarial cources, Artisan Elementary Engineering, Artisan Mechanical Engineering, Salesmanship and Travelling Agents, Agriculture, Horticulture and Dairy-farming. The Government again discussed the problem in a Press Communiqué in July 1940. The idea of a public examination at the end of the post-primary course, corresponding to Form IV, was dropped and it was decided that voluntary diversion to the vocational side should be encouraged by making it an avenue to Government employment. The scheme, however, required a considerable supply of equipment (tools and instruments, of various kinds) which it has been difficult to obtain during the war. The Government therefore found it necessary to postpone the introduction of the scheme until after the war, but in the meanwhile the Director of Public Instruction has been asked to complete it and keep it ready for introduction simultaneously in all high schools of the Province, as soon as circumstances permit. Thus, vocational training so far as this Province is concerned, is only in the planning

stage and as soon as the scheme matures it is hoped that it will ultimately lead to better employment of the population and to a more prosperous nation.

Financing of Education

559. The average annual expenditure on education in the Province since 1930 is around six crores of rupees of which about Rs. 2 crores are spent on elementary education. The average cost of education per head in 1940–41 in public institutions was as follows :—

	RS.	A.
Arts Colleges	152	13
Secondary Schools	37	11
Elementary Schools	6	15

The funds required for purposes of education are derived from the following sources :—

(1) Government grants;

(2) grants made by municipal and other local bodies through levy of an educational cess;

(3) grants by private managements and benefactors; and

(4) school and college fees.

The educational cess levied by local bodies is derived under a permissive power given by the Provincial Government under the Elementary Education Act, 1920. The educational cess varies from district to district. The Government grants are made under various heads. They are generally capital grants, grants for colleges and special schools, grants for secondary schools and grants for elementary schools. Capital grants are made for purchasing, erecting or enlarging school houses, or buildings or hostels, for acquiring land for school, hostel or playground purposes and for the purchase of furniture, apparatus, books and other materials required for school use. Such grants are given to institutions under public and private management. Grants are extended to colleges and college departments providing instruction up to the standard required for a University degree and generally do not exceed half the approved net cost of maintenance for the previous financial year. In the case of secondary schools, the grant is normally half the approved net cost for the preceding financial year. In addition, the management is paid an amount equal to the loss of fee income on account of the award of fee concessions to girl students, Muslims and boys belonging to backward classes and scheduled castes. Half the expenditure incurred on approved scholarships and fee remissions up to a limit of 10 per cent of the fee income is also paid. Grants to elementary schools are made on the qualifications of teachers but the total amount of grant is related to the distribution of pupils in the several standards and to the number of pupils in standards IV and V. A minimum attendance figure is also prescribed before a school can be eligible for a grant.

CHAPTER XIII—HEALTH AND SANITATION

Introductory

560. Next to the appalling poverty of the masses, the most noticeable feature about South Indian village life is the low standard of health maintained by the population. This state of affairs is the result of various causes, but most of them may, in the last analysis, be traced to the economically backward condition of the people. The following tables show the comparative position of United States of America, United Kingdom and India in the matter of per capita income on the one hand and births, deaths and expectation of life on the other:—

Per capita income[1]

	RS.
United States of America	1,406
United Kingdom	980
India	65

Vital statistics[2]

——	Birth rate per mille.	Death rate per mille.			Mean expectation of life.
		Infantile.	Maternal.	General.	
(1)	(2)	(3)	(4)	(5)	(6)
United States of America	17·0	54	8·5	11·2	62
United Kingdom	14·9	58	4·0	12·4	63
India	48·0	162	24·5	33·0	27

The position relating to India as reflected in the figures given above is more or less true of the Madras Province. While the low rate of per capita income is at the back of this sorrowful state of affairs, the more immediate causes which contribute to the low health level of the population are mainly: (1) unsatisfactory dwelling houses; (2) lack of proper water-supply, in rural areas in particular; (3) inadequate sanitary arrangements and disregard of environmental hygiene; (4) paucity of medical and maternity aid especially in rural areas; and (5) general lack of education.

561. Organized public health service in this country is of comparatively recent origin. Till about 1870, the medical services in India were mainly concerned with the improvement of the health of the military. Though the heavy mortality caused by the outbreaks of epidemics such as plague and malaria awakened the Government to the need for more active State participation in improving the health of the population, the efforts were confined, till the reforms of 1919, to the promotion of sanitation by making it one of the important duties of the local bodies. Progress was, however, very slow and the First All-India Conference in 1911 noticed that only 1·4 per cent of the towns and villages in Madras

[1] Planning for India by Bimal C. Ghose, page 14.
[2] The Indian Rural Problem by Sir Manilal B. Nanavati, page 30.

Province had any system of conservancy and that in other Provinces the conditions were no better. The responsibility for local, medical and public health administration was transferred to the Provincial Governments under the 1919 Reforms. Though this has widened the field of the Provincial Government's activity in this direction, the quality of work still suffers from the weak control of Provincial authorities over local bodies to whom the work has been entrusted. The result is that only a fraction of the ground has been covered so far. The level of health services is unsatisfactory even in urban areas and the position is much worse in rural parts. Sanitary reform, village planning and housing schemes are practically unknown in the rural parts of the country, while such medical and maternity relief as has been provided is totally inadequate to meet the needs of the masses.

Housing conditions

562. One important aspect of sanitation is the proper housing of the population. Housing as a definite problem has hitherto been considered only in urban and industrial areas, due obviously to the fact that it is in these areas that the problem of congestion and its attendant evils become directly noticeable and call for continuous attention. The housing problem in the rural areas is of equal, if not greater importance. Contrary to popular impression, actual congestion in some of the villages is greater than in the towns, especially in the deltaic tracts.

In point of numbers, it cannot be said that the houses are too few for the population, having regard to the average number of persons per house as revealed by census figures. The following table shows the number of occupied houses and the population in rural and urban areas in the Madras Province.

Census years.	Number of occupied houses.		Population.		Number of persons per house.	
	Villages.	Towns.	Rural.	Urban.	Villages.	Towns.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1881 ..	5,192,582	518,949	28,143,573	3,027,058	5·42	5·83
1891 ..	6,796,098	640,948	35,749,832	3,581,230	5·26	5·59
1901 ..	6,466,794	739,314	34,327,541	4,295,525	5·31	5·81
1911 ..	7,005,429	861,031	36,950,684	4,919,476	5·27	5·71
1921 ..	7,454,515	961,750	37,489,349	5,304,806	5·03	5·52
1931 ..	8,189,346	1,152,443	40,776,935	6,416,637	4·98	5·57
1941 ..	8,255,725	1,483,291	41,879,082	7,961,482	5·07	5·37

The figures taken by themselves do not indicate any real overcrowding. In fact, from the point of view of overcrowding, statistics of house room in this Province do not have the same importance as in European countries. For the Province as a whole, each house contains on an average five persons and this number has remained practically constant for several decades. House room has increased at least on a par with the growing population. But it is in regard to the quality of the houses and the area of habitable space available in them, that the position is lamentable.

563. Houses in rural areas fall into two broad classes, viz., (1) labourers' houses and (2) ryots' houses. The former is usually built of mud and has a roof of palmyrah thatch. In front there is a verandah or pial, also of mud, and the interior consists of a single room. In many cases even the pial is absent. The dwelling of the average ryot is also usually built of mud but the roof is thatched with bamboo and straw or is sometimes tiled. The pial is raised higher above the ground and the interior consists of four or five rooms opening on to a verandah which surrounds a small courtyard. One of the rooms is used as a kitchen, one as a store-room for grain and other property and the rest as sleeping apartments. The cattle are sometimes—perhaps often—tethered in the courtyard at night, though usually they are lodged under a sloping roof outside the walls of the house. The houses of even the richer villagers are much the same in form though the rooms may be somewhat larger and more numerous while the courtyard may contain a well or sometimes a cess-pool in close proximity. Houses of more than one storey are seldom found in villages, and are not numerous even in towns. As a rule, the houses are ill-lighted and ill-ventilated and window openings are either too few and narrow or totally absent. What is reckoned as a house for census purposes is not a house in the sense that it provides the accommodation, floor space or living room reasonably required for its inmates. Though on an average, the census figures indicate that there is one house for about 5 individuals the living room available in the house is totally inadequate for even a much smaller number and when conditions other than space are considered, perhaps 90 per cent of the rural houses will be condemned without hesitation as unfit for human habitation. The flooring is damp, the walls are deeply indented, light and air practically absent, roofing low and flimsy and in short all the conditions exist which make for sickness and disease. And when it is remembered that the size of the family usually increases as one goes down the social scale, it will be seen that the poor man with a large family inhabits the smallest hut and to the other evils mentioned above, the evil of overcrowding is also added.

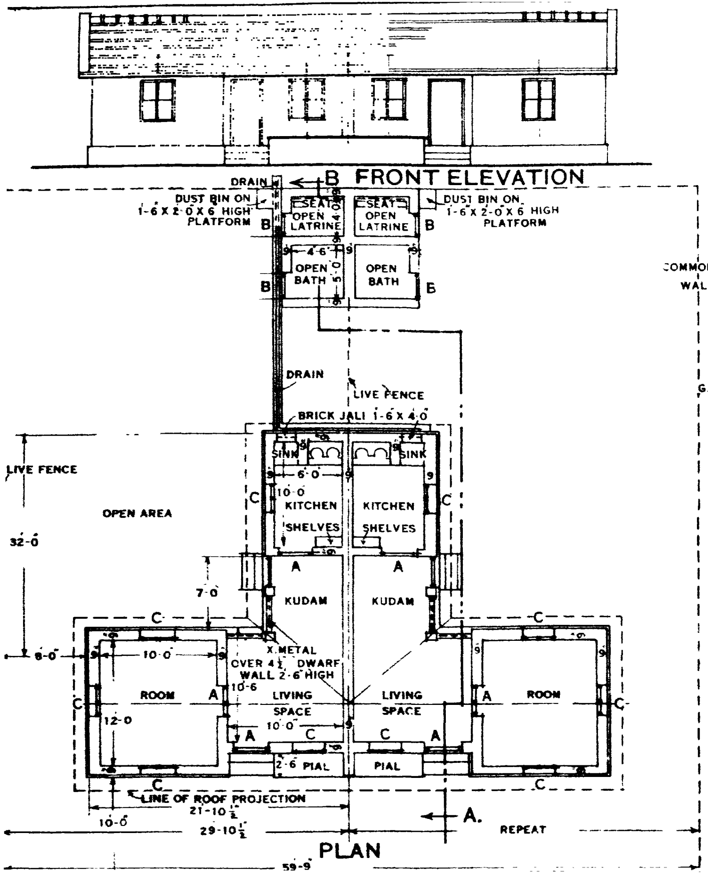
564. The minimum standards necessary for the construction of dwelling houses and the materials to be used in such construction were considered by a special committee of the Public Health Sub-committee formed in connexion with the post-war development of this Province. The Sub-Committee has made the following recommendations :—

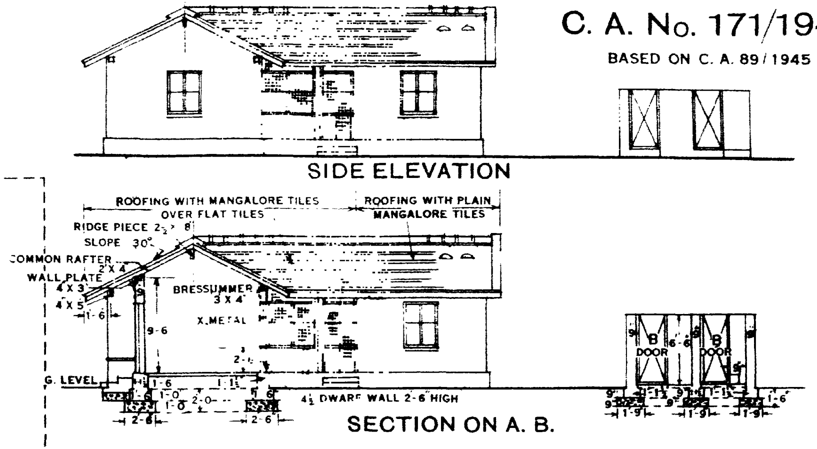
"(1) A house has an average of 5 inmates which may be assumed to consist of four adults and one child. At the rate of 70 square feet for each adult member, the minimum floor space required for a dwelling house may be fixed at 340 square feet. This will include all occupiable floor area including verandahs.

(2) The minimum floor area in any living or bed room should not be less than 120 square feet. The height of those rooms should be not less than 9 feet from the floor level. The floor

C. A. No. 171/1945

BASED ON C. A. 89/1945





— DESIGN FOR A DWELLING HOUSE —
— IN RURAL AREAS —

— SCALE 1 INCH=16 FT. —

NOTE :— FOUNDATIONS ARE TENTATIVE

A – DOOR FRAMED & PLANKED ———————— 3-0 X 6-6

B – DOOR LEDGED BRACED & PLANKED WITHOUT TOP FRAME———— 2-9 X 6-0

C – WINDOW FRAMED & PLANKED WITH IRON OR WOODEN BARS (4 LEAVES) — 3-0 X 4-6

FOR ONE UNIT FLOOR AREA——— 340 SQ. FT.

level of the rooms should be generally at least 18 inches above the level of the adjacent street.

(3) The health of the inmates of dwelling houses is very much dependent on adequate ventilation of rooms and proper perflation of air within rooms. Thorough ventilation and free passage of air should be ensured in the living and bed rooms, and as far as possible windows and ventilators should be provided on opposite sides of the rooms. The aggregate area of the openings provided by windows and ventilators should be at least one-sixth of the floor area of each room. Every window should have upper and lower shutter leaves so that the lower ones may be kept closed with upper ones alone open whenever necessary. It is an additional advantage if windows and doors have fixed ventilating heads.

(4) A small compound attached to the house is necessary. An independant open bath and a latrine, preferably of a flush-out type, should be provided at a corner of the compound screened from the view of the living rooms and sufficiently away from the well if the house is to have its own water-supply.

(5) It is better to have a common protected source of water-supply for a group of houses forming the hamlet or village.

(6) The disposal of house drainage will depend on the arrangements for drainage for the particular scheme of housing as a whole. Subject to this, suitable arrangements must be made in each house for leading off all domestic sullage by the provision of a sanitary type of drain.

(7) At a convenient place in the compound, rubbish bins of suitable size and design should be provided on low masonry platforms about 2 feet by 1½ feet.

(8) When it comes to the matter of drawing up a design, difficulties arise. A dwelling house is as expressive of the ideas of the individual as an article of dress. Habits and customs vary as do also climatic conditions. A great variety of tastes has to be catered for, which is by no means easy. Any design which provides the 340 square feet of occupiable floor area and which generally incorporates the other features mentioned above and which is acceptable to the local authority in charge may be adopted for any particular scheme of housing. To ensure comfort and reasonably healthy living conditions, there should be at least one main room of about 100 square feet and a kitchen of about 60 square feet fully walled. The other 180 square feet may be in the form of a " kudam " and a living space with a minimum of walling but adequately protected from the weather. The living space will be used for sitting during the day and for sleeping at nights for relations or guests common to Indian families. The specimen design appended includes the features mentioned above and is for a roofed building in a single storey generally suitable for rural parts and to open areas in urban localities.

(9) The materials most suited to each case will be those available near the site. Brick or building stones are available in

most localities and would make suitable material for the walls. Brick should be preferred to stone as giving warmer rooms in winter and cooler rooms in summer. Brick or stone may be in lime mortar or lime cement up to basement level and above that in mud mortar wherever suitable for purposes of economy. Plastering is essential and should be in the lime cement combination mortar. As the floor should be also warm, brick concrete in combination with lime cement mortar is suggested, the cream in concrete being rubbed smooth on the top. Doors and windows will be of wood where it is easily available but as timber shortage is likely it may be necessary to reduce wood-work to a minimum and provide pre-cast concrete frames and cement asbestos panels for shutters. Roof may be of Mangalore tiles over wooden or palmyrah rafters and country wood reepers. In addition, flat tiles should be provided for the main room and living spaces. Ridge ventilating tiles may be also provided. Where facilities exist, it would be very much better to convert the roof into reinforced concrete or Madras terrace roofs thus making for greater permanency and cleanliness. A type of roof composed of galvanized iron sheeting covered over by a thin layer of cement concrete may also be tried as an experimental measure.

(10) One difficulty is the question of cost. Having regard to the level of national income and consequent standard of living and heavy financial commitments that a large scheme involves, cost cannot be altogether ruled out of consideration. The cost of a house with the materials recommended and the floor area proposed is expected to be about Rs. 1,100 at the pre-war rates, but it may be more or less according to varying local conditions."

565. These recommendations have been quoted *in extenso* in view of their importance, first as showing in sufficient detail and in concrete terms what, in the view of the experts competent to give an opinion on the subject, the minimum requirements in housing conditions are to ensure a reasonably healthy living; and secondly as showing that the majority of the houses in the Province would require to be demolished and rebuilt and a good many of the rest drastically remodelled if the conditions laid down above are to be satisfied. Inferentially, they also indicate what heavy penalty we are now paying in the shape of sickness, disease, loss of efficiency and premature death by gross neglect of housing conditions. Town-planning in this Province has so far been limited to schemes of planning unbuilt areas mostly in municipalities. Very few schemes have been undertaken by smaller urban local authorities, and none at all for rural areas. Even in municipalities, practically no attempts have been made to rebuild existing areas or to improve insanitary or slum areas. The Government have the power to extend the provisions of the Madras City Municipal Act, Madras District Municipalities Act or the Madras Town-planning Act to any local area and may declare such extension to be subject to such restrictions and modifications as they may think fit.

Advantage has been taken of this by some of the non-municipal authorities and the provisions of the Madras District Municipalities Act in regard to buildings and the Madras Town-planning Act have been extended to certain panchayats also. But the progress so far made has only touched the fringe of the problem. The Madras Public Health Act enacted in 1939 contains some important provisions regarding housing conditions, namely :—

(1) reservation of areas for residential purposes;

(2) control over insanitary buildings;

(3) abatement of overcrowding;

(4) prohibition of occupation in urban areas of new buildings without adequate water-supply and means of drainage; and

(5) provision of sanitary convenience in buildings intended for human habitation.

The formation of co-operative buildings societies is being encouraged by the Government by advancing loans. The little work that has been done so far, has, however, left the village out of account.

566. The first essential for a study of the rural housing problem is to undertake a comprehensive survey of housing conditions at present obtaining in rural areas. It does not appear that such a survey has ever been made so far. Having regard to the fact that about 80 per cent of our population live in rural areas and that housing conditions in those areas constitute a menace to the general health of the people, such a survey is highly desirable and necessary. Similar surveys have been made in some of the European countries like the United Kingdom, France and Finland. Representative villages in specified regions may be chosen for the purpose and an intensive study made of the habitable nature of the houses in them. Such a survey will furnish the data necessary to determine (1) how many or what percentage of houses are already in a fit condition, (2) how many require remodelling and (3) how many require to be demolished altogether and rebuilt. A comprehensive view of the magnitude and nature of the problem may thus be obtained. A plan can then be drawn up to tackle the problem in a systematic way having regard to the various aspects which have a bearing on the problem, viz., the agency best suited to execute the plans, the financial implications and the method of financing the operations and so on. The action taken in certain European countries in the matter of rural housing is described in Appendix 31. Mostly they provide for considerable financial assistance either as subsidy or as loan to local bodies or to recognized house building societies. This is a matter in which co-operation between the Government and the local bodies is necessary. The scope and volume of financial assistance by the Government will have to be considerably enlarged if any perceptible improvement is to be looked for in the vast rural areas of the Province. Intensive educative propaganda among the rural folk is necessary to create a sanitary conscience among them and make them realize

the need and value of properly constructed houses. It has been noticed that the number of houses has steadily kept pace with the increase of population. It is clear, therefore, that new houses are being built as and when the need is felt. It is thus only a question of seeing that the houses which are built are up to proper standard. Propaganda combined with legislative compulsion strictly enforced should enable the object being achieved.

Sanitation

567. [1] In Madras, the earliest legal enactments which contained provisions for the improvement of sanitation, in rural areas and municipal towns were the Madras Act IV of 1871 (the Madras Local Fund Act) and the Madras Act III of 1871 (the Town Improvements Act). They contained provisions for improved vaccination in rural areas and municipal towns by employing trained vaccinators, for the construction and repair of hospitals, dispensaries, and lunatic asylums, for the sanitary inspection of towns and villages, the cleaning of roads, streets, tanks, and other local works of public utility calculated to promote the health, comfort and convenience of the people, and for the registration of vital statistics. These Acts were superseded in 1884 by the Local Boards Act (Act V of 1884). The principle of local self-government was freely extended and as far as possible, the constitution of local bodies administering this Act was made to fit into the already existing institutions of the country which required but little adaptation. From time immemorial, decisions in matters of local importance had been made by village committees known as panchayats. The panchayats were organized and unions and major unions were then constituted. Cleaning of village streets and other public places and doing such other things as were necessary for the preservation of public health formed part of the statutory duties of all unions. The new Act provided, among other objects, for the improvement of village-sites and water-supply, for sanitary arrangements during fairs and festivals, for the scavenging of small towns and large villages, for the construction and repair of markets, slaughter-houses, latrines, dust-bins and drains. The city of Madras had a separate Act of its own (Act I of 1884) which made vaccination compulsory and which contained provisions for regulation of the conservancy of the town and for the improvement of general sanitation. As regards other municipal towns, the Towns Improvement Act of 1871, was superseded by the Madras District Municipalities Act of 1884. There was intense legislative activity during 1919 and 1920 when all the three Acts mentioned above were revised. The Madras Local Boards Act of 1920 came into force on 1st April 1921. There was advance in the legal obligations under the new Act in matters relating to public health. The scattered nature of the provisions relating to public health administration in

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[1] League of Nations Health Organization in British India, pages 119–120.

municipal and rural areas among a number of Acts rendered their proper working difficult and the need for a compact and separate Act for the whole Province embodying all the provisions essential for the advancement of public health was felt. This long-felt need was met by the Madras Public Health Act of 1939. The salient features of the Act are: (1) constitution of Public Health Board for the Province; (2) statutory recognition of the Director of Public Health and vesting of adequate powers in him for the effective discharge of his duties; (3) taking of power: (*a*) to compel the employment of Health Officers by important local authorities; and (*b*) to fix the scales and the conditions of service of the public health establishments employed by local authorities; (4) provision that local authorities should earmark a definite percentage of their income for public health expenditure; (5) imposition of an obligation on local authorities at the discretion of the Government to provide a sufficient supply of drinking water; and provision for the compulsory levy of water-tax for financing water-supply schemes; (6) effective provisions for securing proper drainage, and a sufficient number of public latrines, (7) prevention and abatement of nuisances; (8) adequate measures for the prevention and eradication of infectious diseases; (9) prevention, treatment and control of venereal diseases; (10) maternity and child-welfare measures; (11) mosquito control; (12) reservation of areas for residential purposes; control over insanitary buildings and the abatement of overcrowding; (13) registration of lodging houses; (14) food control; and (15) special provisions regarding fairs and festivals, including the levy of a pilgrim-tax in the case of water-borne traffic and of tolls on vehicles.

568. The present organization of the Public Health Department consists of the Director of Public Health who is the head of the department and is directly responsible to the Government; four Assistant Directors of Public Health, one Assistant Directress of Public Health and two Health Officers, one for nutrition and the other for research. Their duties are given below :—

Designation.	Subjects in-charge.
1. Assistant Director of Public Health (Vaccination).	Vaccination and Smallpox: Infectious Disease Hospital; Water supply; Drainage; School hygiene; Budgets of local authorities; Inspection reports and Accounts.
2. Assistant Director of Public Health (Vital statistics).	Vital statistics; Sanitary Law and Administration; Industrial Hygiene; General Sanitation.
3. Assistant Director of Public Health (Epidemics and Fairs and Festivals).	Epidemic and endemic diseases; Sanitary conveniences; Fairs and Festivals; Port and Marine Hygiene.
4. Assistant Director of Public Health (A.R.P. and Establishment).	Establishment; A.R.P. and Civil Defence; Malaria.
5. Assistant Directress of Public Health (Maternity and Child Welfare).	Maternity and Child-welfare; Health school for the training of Health Visitors.
6. Nutrition Officer	Nutrition; Compost; Propaganda.
7. Research Officer	Research.

Each of the first three officers is also in charge of a group of districts for purposes of supervision and control of the work of the executive staff. The executive staff consists of Health Officers, Health Inspectors, Regional Malariologists, Health Visitors, midwives and vaccinators. There are two classes of Health Officers, First-class Health Officers are of gazetted rank and possess a degree in Medicine and a degree or diploma in Public Health. They are in charge of districts as District Health Officers (25) and in charge of municipalities with a population of over 50,000 (22). The second-class Health Officers are non-gazetted officers belonging to the Madras Public Health Subordinate Service. They possess a diploma in medicine and a diploma in public health and are in charge of smaller municipalities (48) and are also appointed as Assistant District Health Officers (20). The Health Officers are the executive officers for the administration of public health in local areas. Their duties include control of epidemic and endemic diseases, institution of measures for immuno-prophylaxis, improvement of environmental sanitation, sanitary control over food supplies and dangerous and offensive trades, sanitary arrangement of fairs and festivals, supervision of registration of vital statistics, organization of maternity and child-welfare relief, health propaganda and research. On an average, there is one Health Inspector (who is a qualified Sanitary Inspector) for each taluk and the total number of Health Inspectors is about 350. For malaria investigation and control, there are three Regional Malariologists of the First-class Health Officer's rank—each in charge of a group of districts. Separate Health Officers are in charge of special malaria schemes. The local authorities employ in addition Women Medical Officers, Health Visitors and midwives for maternity and child-welfare work and sanitary inspectors and vaccinators for other health and sanitary duties.

There is a statutory Public Health Board to advise the Government on Public health questions referred to them. Some missionary bodies and voluntary organizations also take active part in certain items of public health work like tuberculosis, leprosy and maternity and child-welfare work. A few Tuberculosis Sanatoria and Leprosoria are run by them.

569. Although the Province can boast of a well organized Public Health department, the public health services are still in a rudimentary stage, in spite of progress in the field of public health legislation. Whatever work has been done in regard to conservancy and sanitary convenience has been directed towards improvement of municipal areas and to a lesser extent of smaller urban local areas. In regard to the rural areas, there is practically no conservancy or sanitary service at all. The Royal Commission on Agriculture remarked in 1928 that in the rural areas of the country sanitation in any accepted sense of the word was practically non-existent. The bank of a stream or the margin of a tank is commonly used as a public latrine and this predisposes to hookworm infestation

and to the spread of all the diseases which are caused by a polluted water-supply, for the same water is in many places used both for drinking and for bathing. These conditions still exist in practically the entire rural area. There is on an average only one Health Inspector for a revenue taluk comprising about five hundred village units scattered over an area of nearly 500 square miles and containing approximately 200,000 population. He is in charge of all public health activities in his area other than maternity and child-welfare work. His jurisdiction is so large that ordinarily he can visit a village only once a year. The District Health Officer has the whole revenue district as his jurisdiction, that is, nearly 5,000 square miles with 2 million population. Only a very small proportion of the villages in his jurisdiction can be visited by him each year. The first need therefore would appear to be a substantial increase in the organization of the health services.

570. The two outstanding problems connected with rural sanitation are (1) the prevention of soil pollution by indiscriminate defecation and (2) the provision of adequate and safe water-supply for villages. A rural sanitation campaign was instituted several years ago. A detailed survey of hookworm infection was completed in 1927 by the Ankylostomiasis campaign of the International Health Board under the Rockefeller Foundation of America and the immensity of the problem was clearly demonstrated. As a result, the Government took over all further work from them and started the Rural Sanitation Campaign in 1928 for the prevention and control of hookworm infection in the Province. The Rural Sanitation staff consists of one Rural Sanitation Officer and six Rural Sanitation Units which work in the several districts by rotation. The chief activities of the units are—(1) educational propaganda on hookworm and the dangers of soil pollution; (2) hookworm treatment; and (3) provision of latrines in villages. A perusal of the Public Health Administration Reports of this Province shows that the construction of suitable types of latrines is slowly progressing year by year and that local bodies are setting apart specific sums for the purpose. But the pace of progress is very slow and the amounts allotted too small to make any real impression on the general level of public health in the Province. Borehole latrines are considered the cheapest and most efficient for rural areas and they require the minimum of attention. The matter engaged the attention of the Post-war Development Committee of the Province and one of the schemes formulated in that connexion envisages that within a period of 20 years there should be a minimum of ten public latrines for the area served by each health centre (a group of villages within a radius of five miles) and that construction of private latrines should be enforced wherever feasible. The scheme also contemplates the making of standardized conservancy plant and equipment at each district headquarters by starting workshops. The cost of the scheme for the first five years is estimated at a little over Rs. 1,00,00,000, to be met by local bodies with loans from the Government.

Rural water-supply

Early history

571. The earliest attempt made by the Government in regard to rural water-supply in the Province dates back to the nineties of the last century. A definite attack on the problem was, however, made only in 1913. It was in this period that a large number of typical designs for the improvement of the several kinds of sources of water-supply were prepared and issued with the approval of the Sanitary Board. In 1915, the Government set themselves to the task of providing one well at least in every village of 500 inhabitants. Accordingly lump-sum grants were given to local bodies every year out of the minor "sanitary grants" for improvement of water-supply in rural areas, and other minor sanitary works. In 1920, on the recommendation of the Financial Relations Committee the minor sanitary grants as such were discontinued; the Government, however, contributed towards the cost of rural water-supply schemes where local boards put forward specific schemes which had been examined and certified by the sanitary and engineernig authorities, subject to the condition that the areas for which the water-supply was intended should be constituted into unions and rates levied to cover a portion of the cost. Later, in 1925, the Government on the representation made by the presidents of local boards and the Registrar-General of Panchayats, decided once again to make half grants to district boards towards rural water-supply schemes in rural areas. The grants made by the Government from 1925 to 1937 are given below :—

Year.	Amount of grant sanctioned.	Year.	Amount of grant sanctioned.
(1)	(2)	(1)	(2)
	RS.		RS.
1925–26 ..	6,25,000	1933–34 ..	3,11,520
1926–27 ..	3,14,333	1934–35 ..	1,50,500
1927–28 ..	7,39,500	1935–36 ..	2,05,900
1928–29 ..	9,00,000	1936–37 ..	2,97,500
1929–30 ..	5,45,576		
1930–31 ..	3,94,173	Total ..	50,25,312
1931–32 ..	2,16,310		
1932–33 ..	3,25,000		

The amounts actually drawn by district boards totalled about Rs. 32 lakhs only. These grants were ordinarily utilized for the cleaning and renovation of existing draw wells and tanks in areas most prone to acute distress. These, no doubt, improved matters and relieved distress here and there, but they touched only the fringe of the problem; the great task of providing protected water-supply to all the 35,430 villages of the Province still remained unexplored.

572. A step forward was taken in March 1936 when, while introducing the budget of 1936–37, the Finance Member of the

Government of India announced that a sum of Rs. 108½ lakhs would be distributed to Provinces from the Rural Development Fund and that Madras might receive Rs. 16 lakhs. The grant actually received was Rs. 15 lakhs and it was in addition to a grant of Rs. 14 lakhs previously given to this Province in 1935 for the development of rural areas. The grant was to be utilized, among other schemes, on the improvement of rural water-supply. In 1937, the Congress Government in this Province announced the introduction of a comprehensive scheme of protected water-supply for rural areas, the scheme being financed from Provincial funds. From that year onwards the rural water-supply schemes of this Province were financed on the one hand by the grant given to this Province by the Government of India and on the other, from Provincial funds under the comprehensive scheme. A brief account of the two schemes is given below.

Government of India grant

573. Out of the first grant of Rs. 14 lakhs, a sum of about 5·5 lakhs was allotted for the provision of drinking water in villages where the supply was inadequate or did not exist and where the local boards were not in a position to meet the expenditure, with the aid of the usual half grants from Provincial funds. The amount was distributed as shown under :—

—	Amount allotted for protected water-supply.	Amount allotted for well works.	Total.
(1)	(2)	(3)	(4)
	RS.	RS.	RS.
District boards	53,620	4,13,491	4,67,111
Panchayat boards	9,585	40,415	50,000
Agency tract	..	30,822	30,822
Total ..	63,205	4,84,728	5,47,933

The second grant of Rs. 15 lakhs was distributed to Collectors of districts for utilization on the approved categories of schemes. The works executed from this grant were on a contributary basis, i.e., the villages or other areas benefited from the grant had themselves to make a contribution in cash or in kind (by labour or the like) of at least a third of the cost of the schemes. The total amount spent from the grant and the local contributions up to the end of 1943–44 on the schemes relating to rural water-supply was about Rs. 7·40 lakhs. The number of works executed with the aid of the second grant is given below :—

Number of new wells constructed	1,873
Repairs and improvements to existing wells ..	469
Fresh-water tanks and ponds dug	1
Repairs and improvements to tanks and ponds.	31
Total ..	2,374

Provincial comprehensive scheme

574. In 1937, the Government placed at the disposal of Collectors of the eighteen districts for which a programme was then ready, a sum of Rs. 1,08,000 for the provision of water-supply in selected villages during the year 1937–38. The scheme was intended to cater to the needs of rural areas and panchayats with a population of less than 5,000 or an income of less than Rs. 3,000 a year. Wells were to be provided under the scheme in the order of urgency. The considerations for deciding priority of need were the acute scarcity in the village, the distance of the nearest source of supply available, the prevalence of cholera and other water-borne diseases and the potability of the water actually available. The contributions from the villagers were not compulsory. The scheme was to be spread over a period of ten years. Difficulties were, however, soon encountered in the course of the execution of the schemes and the ten years' programme could not be adhered to. In 1941, it was given up in favour of an annual programme to be prepared by Collectors. As the ten-year programme contained a complete compendium of requirements of the Province as regards rural water-supply, Collectors were instructed to take that programme into account in drawing up their one-year programmes. From the initiation of the scheme in 1937–38, the total grant made from Provincial funds to the water-supply fund up to 1944–45 amounted to Rs. 58·35 lakhs. (The net expenditure booked against this fund up to 1944–45 was Rs. 53·76 lakhs.) The statement in Appendix 30 shows the progress made up to 1945–46 and the work remaining to be done. The number of works executed up to 1945–46 and the cost involved are 8,076 and Rs. 64,87,604, respectively. The works relating to the first half of the ten-year programme which have not been executed will be taken up for execution during the first five post-war years and the balance thereafter. When all these works are completed it is hoped that every village in this Province will be provided with protected potable water-supply.

Types of water-supply

575. The types of water-supply may broadly be classified as protected and unprotected. The protected types are—(1) closed or open dug wells with or without overhead tanks and taps; (2) bore-wells with pumps; (3) pipe supply from or connection with water mains from town reservoirs; and (4) natural springs and artesian wells. The unprotected types are—(1) step wells; (2) vakkaranis; (3) open irrigation tanks, canal and river diversion tanks; and (4) underground tanks for collection of rain water from roofs and terraces. The classification is but arbitrary; for, the degree of protection desirable in a particular case varies in different localities with reference to the possible sources of contamination, the composition of the soil, the nearness of cultivated lands, and the nature and depth of the water source itself. The forms of

protected water-supply prescribed for execution in this Province are the following :—

(1) a closed well with an overhead tank and taps;

(2) a bore-well with pumps attached;

(3) a connection from existing municipal water mains wherever these happen to pass through or near villages; and

(4) a protected draw well in places where the above three types of water-supply cannot be undertaken.

Collectors have been given the discretion to choose the types best suited for the places for which water-supply is to be provided. Improvements to, and protection of, the existing sources of supply, whether wells or tanks, are also undertaken.

Purity

576. There is wide divergence of opinion among experts regarding the degree of chemical purity of water and the degree of protection desirable for human consumption. The classification has therefore to be based on the average conditions prevailing in villages in most of which the only real protection necessary is against bacteriological contamination and organic impurities. Other forms of impurities such as the presence of dissolved mineral salts in excessive proportions do not admit of preventive measures and are beyond the scope of practical solution in a comprehensive scheme of rural water-supply. Most of the waters found in this Province have one or another of the minerals mentioned in the following table which has been prepared by the Rural Water-supply Committee for general guidance :—

	Mineral impurity.	Nature of the impurity.		Safe limit (parts per 100,000).	Tolerable upper limit (parts per 100,000).	Physical and external indications (rough test of excessive quantities).	Purification measures when in excessive proportions.
	(1)	(2)		(3)	(4)	(5)	(6)
1	Calcium carbonate.	..	Hardness.	..	..	Soap does not easily produce lather.	Boiling or adding lime.
2	Magnesium carbonate.	Temporary hardness.					
3	Calcium sulphate.	Permanent hardness.					
4	Magnesium sulphate.			20	30	Bitter taste, causes purging at first.	By adding soda ash or sodium carbonate.
5	Calcium chloride.						
6	Magnesium chloride.						
7	Sodium chloride (common salt).	..	Alkaline waters.				
8	Sodium sulphate.						
9	Sodium carbonate or bicarbonate (soda ash).			40	50 to 75	Brackish taste.	No known treatment.
10	Iron as ferrous oxide.	..		0.05	0·15	Discolouration of wash basin and clothes. Cloudy appearance after removal.	Aeration and addition of lime water.
11	Ammonia (free) ..	Organic impurity.		0·12	..	Bad smell ..	Aeration and exposure to sun light.
12	Albuminoid ammonia.	Do.		0·28	..	..	Do.
13	Total solids inclusive of all the above salts.	..		50	50 to 200	Unpleasant taste.	..

Most waters found in the Province are hard and alkaline in varying degrees. Other impurities such as phosphates, nitrates, and acidity due to swamps and vegetation are also found in the waters in certain isolated areas. As a rule, water from wells dug is not subjected to chemical and bacteriological examination unless there is cause for definite suspicion in any particular case. The real test is whether it is palatable to the taste and free from bad odour and whether it cooks and preserves food--particularly rice and dhall.

Maintenance

577. The agency for the maintenance of, and repairs to, wells is the Revenue Department. The cost is recovered from district boards in the case of works in non-panchayat areas and from panchayat funds in the case of works in panchayat areas under sections 121 and 126 of the Madras Local Boards Act (XIV of 1920), respectively. A register of wells is maintained, in order to have reliable data about the number of public wells in each village or hamlet, the adequacy of water-supply by renovating or repairing the wells. The object of such a register is to help the Government in making the annual budget allotment for rural water-supply and in seeing that the money is spent where it is needed most and in the most economical manner.

Medical and maternity relief

578. The Medical department deals with medical relief, medical education and medical research. In regard to medical relief, the department is responsible for the maintenance of important hospitals in the Madras City and at the headquarters of districts and taluks and in special tracts. The responsibility for medical relief in rural areas devolves upon local bodies which are assisted by the Government, in several ways, by loan of services of their medical officers, by grants for medical buildings and by subsidies to rural medical practitioners. The following statement shows the number of medical institutions maintained by the State, local bodies, private agencies, aided and unaided, railways and rural dispensaries during the period 1880–1944 :—

Statement showing the number of medical institutions

—	1880.	1890.	1900.	1910.	1920.	1931.	1944
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. State—public ..	13 (I and II)	16 (I and II)	19 (I and II)	14	44	189	183
II. State—special ..				51	46	32	26
III. Local Fund	198	380	426	467	517	* 491	470
IV. Private—aided ..	5	18	19	25	29	409	67
V. Private—non-aided ..	2	1	..	36	54	73	79
VI. Railways	..	..	..	44	47	51	53
VII. Rural dispensaries ..	..	..	..	..	..	..	321
Total ..	218	415	464	637	737	1,245	1,199

* Includes those subsidised by the Government in rural areas.

The total number of medical institutions has increased from 218 in 1880 to 1,199 in 1944. The statement below shows the number of beds provided for in-patients; the number of in-patients, the number of out-patients and the daily average during the same period :—

Statement showing the number of beds, in-patients, out-patients and the daily average attendance

Year.	Number of beds.	Number of in-patients.	Daily average.	Number of out-patients.	Daily average.
(1)	(2)	(3)	(4)	(5)	(6)
1880 ..	3,229	38,870	2,071	1,274,434	9,963
1890 ..	3,552	47,739	2,223	2,663,418	17,796
1900 ..	4,649	62,906	2,857	4,811,125	26,445
1910 ..	5,317	77,633	3,429	6,007,735	36,721
1920 ..	7,360	1,25,910	5,613	7,672,562	41,198
1931 ..	9,451	2,07,847	8,476	14,209,576	92,249
1944 ..	15,186	4,10,751	17,515	18,645,247	1,36,915

Medical relief in rural areas

579. Till 1924, the amount spent on medical relief in rural areas was only a small fraction of the total expenditure on hospitals and dispensaries in the Province. The great mass of the village population had no easy access to qualified doctors and had to content themselves to a great extent with the services of unqualified men. In that year the Government considered the problem of bringing qualified medical aid within easy reach of the rural population and felt that immediate steps should be taken in that direction. With the funds at their disposal, the Government considered that the establishment and maintenance of a well-equipped public hospital or dispensary in almost every village or for each small area was not possible and that some alternative scheme had to be devised whereby something substantial might be done at once with the funds available, at least as an earnest of the Government's desire to bring medical relief within easy reach of the rural population. Accordingly, the Government inaugurated a scheme for opening subsidised rural dispensaries. Under the scheme, qualified practitioners of both Western and Indian systems of medicine are given small subsidies as an inducement to settle down in selected villages and set up private practice. The liability of the Government on account of the scheme is restricted to the payment of subsidy for the medical practitioner and midwife. The cost of medicines and other contingent charges are met by the local boards concerned. The grant of subsidy is subject to the condition that the medical practitioner should give free treatment to the necessitous poor. The practitioner is at liberty to accept such fees for medical attendance and medical treatment as he can get from well-to-do patients. Besides these dispensaries, some rural dispensaries are maintained entirely from the funds of local boards. The number of rural dispensaries working at the end of 1944 was 321.

Maternity relief

580. One of the important activities of the Public Health department is "Maternity and Child Welfare work". There is a separate section in the Public Health department in charge of an Assistant Directress of Public Health. She is responsible for guiding the local bodies in carrying out the maternity and child-welfare schemes on approved lines. The schemes are financed by local bodies and in some cases by voluntary and philanthropic organizations.

The high infant and maternal mortality in this Province during the early years of this century was attributed to a certain extent to the lack of skilled aid at child birth and facilities for ante and post natal care of the mother. In 1916, the number of salaried midwives employed by district boards and municipalities did not exceed 400 and this number was insufficient to attend to more than a very small proportion of births. The rest of the births were handled by barber midwives or "thais" whose ignorance of hygiene or even cleanliness was stupendous. They performed the duties of physician, midwife and scavenger. Their methods, the instruments used by them and medicaments given to both mother and child were revolting. The lack of trained midwives was keenly felt and the Government on the recommendations of a committee of experts appointed in 1915, sanctioned a proposal to increase the provision for the training of midwives in Madras hospitals from 64 to 100. The desirability of opening training schools for midwives in all up-country lying-in hospitals was recognized by Government. There were no organizations for pre and post-natal care nor any child-welfare centres. The Madras Corporation for the first time inaugrated its child-welfare scheme in 1917 in two centres of the City and slowly extended the scheme as the people became familiarized with the campaign. The Madras Presidency Child-welfare and Maternity Relief Association, a purely voluntary health association, was also gradually spreading its activities; its objects were not, however, to relieve the local bodies of their responsibilities, but rather to guide, advise and assist the local bodies in their efforts to ameliorate conditions. The main objects of the association were similar to those of "The Lady Chelmsford All-India League for Maternity and Child-welfare" and were as follows:—

(*a*) Training of health visitors and maternity supervisors and rendering of financial assistance in the employment of trained personnel where necessary;

(*b*) propaganda in connexion with the objects of the association; and

(*c*) the formation and establishment of branches of the association and the affiliation with the association of other bodies having similar objects without unduly interfering with the organization and administration of affiliated institutions or with powers of raising money.

581. Under the Madras District Municipalities Act, 1920, and the Madras Local Boards Act, 1920, the provision of adequate facilities for maternity and childwelfare work is the responsibility of the local bodies. But the progress made by the local bodies has been scanty. In 1921, the percentage of births attended by midwives to the total number of births was 2·8 for district boards and 23·9 for municipalities as shown below :—

—	Number of midwives employed.	Number of labour cases attended.	Average per midwife.	Number of births registered in 1921.	Birth rate.	Percentage of cases attended by midwives to total births registered.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
District Boards ..	394	29,707	77	1,032,044	25·1	2·8
Municipalities ..	183	22,609	124	94,209	31·2	23·9

582. In 1923, the Government placed before local bodies a comprehensive memorandum on the subject and asked them to carry out certain recommendations. The main recommendations were—

(1) Improvement of maternal relief—by dispensing with barber midwives and by providing a sufficient number of trained midwives;

(2) establishment of ante and post-natal clinics and child-welfare centres;

(3) employment of lady health visitors either voluntary, or trained and paid or both;

(4) provision of maternity labour wards;

(5) provision of children's hospitals; and

(6) propaganda campaigns.

583. The results achieved were, however, very disappointing. The centres established by 1927 were only 55 for the whole Province. This was due to general illiteracy of the masses, indifference of local bodies, paucity of funds to maintain the centres, absence of trained health visitors, lack of facility for the training of "thais" and midwives, and want of treatment centres for children. The Government then considered that mere advice to local bodies alone would not bear fruit and that they should take the initiative and devise practical measures and put them into operation. Accordingly, they considered that a special staff should be employed—

(1) to bring home to local bodies the importance of the question;

(2) to enlist the sympathy of the public;

(3) to organize maternity and child-welfare centres in every town and village of importance;

(4) to take stock of the existing organizations and to co-ordinate their activities; and

(5) to ascertain the requirements of several localities.

With that end in view, a special section in the Public Health Department in charge of an Assistant Directress of Public Health

was formed in 1931. In 1934, the Government laid down the following general principles regarding the conduct of maternity and child-welfare work for the guidance of the local bodies:—

(1) The local body should be ultimately responsible for the finance, administration and management of the work in its jurisdiction;

(2) The District Health Officer or Municipal Health Officer should have general control and supervision over the work and should be responsible for giving effect to the schemes drawn up with the approval of the Director of Public Health;

(3) A medical woman should be in immediate and direct charge of the work and should function as the Assistant to the Health Officer;

(4) Women health visitors should be appointed as they become available since they form an important link between the work carried on at the centres and the women in their homes, and are the main agents for the educative work undertaken by the scheme; and

(5) Since the primary health problems of women centre round the periods of pregnancy and labour, the first essential requirement in any scheme of maternity and child-welfare work is that midwives should be appointed according to the needs.

584. Organized on the above lines, the maternity and child-welfare work in the Province has progressed steadily. The local bodies have also taken keen interest in the work as will be evident from the allotments made by those bodies for expenditure on maternity and child-welfare work. In 1942, district boards and municipalities spent Rs. 1,08,665 and Rs. 4,22,333, respectively, making a total of Rs. 5,30,998 on their maternity and child-welfare schemes as against a total of Rs. 1,16,681 in 1931. The statement in Appendix 28 shows the progress made during the years 1935 to 1944 in the establishment of maternity and child-welfare centres in rural areas excluding municipalities, the number of medical women, health visitors and midwives employed, the number of cases receiving skilled aid at child-birth, the maternity beds in hospitals and dispensaries. The statement in Appendix 29 gives details of maternity and child-welfare work done in rural areas. It will be seen that the maternity and child-welfare work in this Province is progressing steadily and satisfactorily though not to the extent required to meet the problem adequately. Out of 1,494,134 live births in 1944, the number of cases which received skilled aid was only 147,091 making a percentage of 9·72 to the total number of births. About 13·5 lakhs of births have not received skilled aid.

Post-war development

585. The social public health services come under the programme for medical care of the population which includes both curative and preventive medicine. Close co-ordination between

these two sister departments has been aimed at in the formulation of new schemes in order to achieve the best results and to prevent any overlapping of efforts. The plan is based on village, taluk or group and headquarter centres, suitably located and equipped (both for medical relief and public health services) and connected with one another by road and telephone communications and served by ambulance services.

Village centres

586. The village centres will be located in such a way that no village will be farther than five miles from each such centre. In heavily populated areas, however, the population factor will be combined with the distance factor. In such areas there will be one village centre for every 10,000 to 12,000 persons. The dispensary and health centre as well as the entire medical and public health staff of each village centre will be accommodated in suitable buildings. Eight beds will be provided at each village centre, two for the emergency ward, two for the isolation ward and four for the maternity ward. The staff of each centre will consist of a doctor, compounder, midwife, a man of all work and a sweeper for curative work and a Health Inspector, health visitor and two midwives for preventive and public health work. The treatment of cases of infectious diseases admitted to the isolation ward will be the responsibility of the medical officer, while disinfection, immuno-prophylaxis, home isolation, control of carriers or vectors, as the case may be, and quarantine, will be the functions of the Health Inspector. In regard to school hygiene, medical examination of school children and the treatment of their defects are to be carried out by the medical officer, while the sanitation of the school premises and the nutrition of the school child will be looked after by the Health Inspector. The health visitor will follow up the school children and assist in any scheme of school feeding. Similarly in regard to industrial hygiene, the medical officer will undertake the periodical examination of the workers wherever necessary, while the Health Inspector will be in charge of the sanitation of factories, protection of workers in hazardous occupations and control of dangerous and offensive trades. The other important functions of the Health Inspector will be the improvement of registration of vital statistics, sanitary control of food supplies, health propaganda, improvement of environmental sanitation and housing.

In regard to maternity and child-welfare, the health centre will provide for organized pre-natal service, efficient maternity service, and post-natal infant and child-welfare work. The Health Visitor will visit expectant mothers in their homes to ensure the observance of proper pre-natal hygiene. An ante-natal clinic will be held at the centre once every month when expectant mothers will be medically examined by the Woman Medical Officer for

maternity and child-welfare work attached to the taluk or group centre. The maternity service for normal labour cases will be provided by the two midwives attached to the health centre. All complicated cases of pregnancy and labour will be removed to the maternity hospital at the taluk or group centre. The midwives will also be available for domiciliary attendance at confinements. The health visitor will make post-natal visits to the mothers and will be in charge of infant hygiene and the welfare of the pre-school child. There will be an ambulance service to remove the patients from the health centres to the taluk or group centre. The appended diagram shows the activities of the health centre as outlined above. This post-war plan is phased over a period of 20 years and at the end of the period the whole Province will be served by efficient medical and health centres.

CONCLUSION

The aim of this book is to afford a background for those who desire to improve the economy of rural life. Planning is based on data, both factual and statistical. A great deal of misconception exists as regards the possibilities of rural development. On the one hand, there are enthusiasts for rural development who have vision without facts and are worried that nothing is being done. On the other hand administrators in the districts and their technical advisers possess a great deal of information, but often this is not placed in perspective and the facts are not adequately used for constructive work. They may have facts without vision. They feel that nothing can be done. A combination of the enthusiasm of the reformers with the information of the officers is what is needed to shape and implement a rural plan. This book would have fulfilled its purpose if it gave the necessary facts as a whole, so that the possibilities as well as the limitations of development are known before a plan is formulated.

The picture that emerges from a study of the facts is somewhat as follows :—

The ancient village of India has lost its character as a cradle of culture. It is no longer a self-contained and integrated unit of the society. With the impact of production for external markets and the introduction of a cash economy, its prosperity has come to be linked with forces beyond its control, forces that have very often global repurcussions. Quick means of communication and electric power are tending to destroy the differences between the small towns and the bigger villages. To-day the village is an aggregation of human beings and is mainly characterised by being a unit of cultivation. It is not knit by communal ties and codes sanctified by tradition, but forms part of a much larger society which has not yet built up a safe foundation in economics or social conduct.

Rural planning has to take account of this change. The village can no longer be considered as a single unit. It has necessarily to be taken as a unit in a larger group. The size of this group will depend on the subject for which plans are made. For education and maternity facilities the group cannot be very large. For the utilization of certain improved techniques in agriculture, large areas can be taken. For marketing and credit facilities the area will perhaps be intermediate between these two. For tenancy reforms a whole countryside will be the unit. The Central concept, however, is that of a " rural group." Plans for development should be based, thus, on a group of villages as the unit. The plans of the Government of Madras which are based on the administrative " firka " consisting of 15 or 20 villages, thus, proceed on right lines.

Against the background of the studies made in this book, it is seen that in regard to tenancy, one should aim at the gradual elimination of rentiers, whether zamindari or ryotwari. The splitting up of land into minute and uneconomic holdings has to be prevented. Crops have to be protected against the vagaries of the monsoon by the provision of water-supply. To this end the present theory that an irrigation source should pay for itself has to be exploded and the broader social value of insurance against crop failure recognized as demanding a legitimate expenditure of public money, irrespective of a direct *quid pro quo* for each individual work of irrigation. Research on the effects of water on a hitherto dry area should be made to precede the introduction of irrigation in a tract. Famines should be avoided, and not merely dealt with when they occur. The field for technological studies in agriculture is immense. Soils have not been studied in relation to physical texture, chemical composition, ground water conditions, and then related to their suitability for particular crops. The breeding of purer and better types, by selection or hybridization, has to be related to such studies of environment. A great deal of work remains to be done on "single crop" research. An anti-erosion drive is necessary, for dry and wind-swept tracts at least, as a beginning. Manure supply has to be greatly increased. Plant diseases and pests have to be controlled. The organization for carrying the results of these studies to the cultivator needs overhauling. We have too many cattle, most of which are a drain on resources. Recognized breeds have to be multiplied and local breeds upgraded by selective breeding.

The entire range of work mentioned above will be useful only if facilities are afforded to the cultivator to have credit to cultivate and credit on the produce, to sell favourably. Both these facilities are linked with the larger question of guaranteeing a minimum price for the produce. To the cultivator as a person, the problems of employment during leisure periods is important. To the economy of the country the decentralization of industries is important. These two forces, together, make rural industries an indispensable part of rural planning. As a person, the cultivator also needs facilities in education and prophylactic and curative health measures which are sadly lacking to-day.

From the point of view of the State, these measures have to be envisaged as part of a plan that has a target in time and space. The fixation of such a target is the only practical method of ensuring that work proceeds according to a desired pace and along desired lines. The aim of this book is to render the formulation of such a plan easy.

APPENDICES

APPENDIX No. 1

[Referred to in paragraph 5]

Statement of monthly average rainfall in the Province

Names of districts.	January.	February.	March.	April.	May.	June.	July.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Northern Circars—							
Vizagapatam	0·3	0·7	0·6	1·1	2·7	4·9	5·7
East Godavari	0·2	0·4	0·4	0·7	1·9	5·0	6·9
West Godavari	0·2	0·4	0·4	0·7	1·8	5·1	7·8
Kistna	0·2	0·4	0·4	0·7	1·5	4·4	7·0
Guntur	0·3	0·4	0·3	0·6	1·6	3·3	4·6
Average ..	0·2	0·5	0·4	0·8	1·9	4·5	6·4
Deccan—							
Kurnool	0·1	0·2	0·2	0·7	1·4	2·6	3·8
Bellary	0·1	0·2	0·2	0·8	2·0	2·3	2·6
Anantapur	0·1	0·2	0·2	0·8	2·0	2·1	2·2
Cuddapah	0·3	0·1	0·2	0·7	1·6	2·4	3·2
Average ..	0·2	0·2	0·2	0·8	1·8	2·4	3·0
The Carnatic—							
South Arcot	1·7	0·6	0·5	1·1	1·9	1·8	2·9
Chingleput	1·3	0·5	0·4	0·6	1·4	2·0	3·5
Nellore	1·0	0·3	0·3	0·5	1·4	1·6	2·6
Average ..	1·3	0·5	0·4	0·7	1·6	5·4	3·0
The Central districts—							
North Arcot	0·9	0·3	0·4	0·9	2·6	2·4	3·4
Chittoor	0·7	0·4	0·4	1·0	2·4	2·4	3·0
Salem	0·4	0·3	0·5	1·7	4·1	2·2	2·5
Coimbatore	0·5	0·4	0·7	2·1	3·4	1·4	1·5
Trichinopoly	1·0	0·4	0·5	1·7	3·3	1·4	1·6
Average ..	0·7	0·4	0·5	1·5	3·2	2·0	2·4
Southern districts—							
Tanjore	2·2	0·7	0·7	1·5	2·0	1·4	1·9
Madura	1·0	0·6	0·8	2·4	2·9	1·3	1·4
Ramnad	1·5	0·8	0·9	2·1	2·0	0·9	1·2
Tinnevelly	1·8	1·2	1·5	2·1	1·4	0·8	0·7
Average ..	1·6	0·8	1·0	2·0	2·1	1·1	1·3
West Coast—							
Malabar	0·3	0·3	0·8	3·4	8·1	30·4	33·9
South Kanara	0·2	0·1	0·2	1·6	5·9	39·8	47·5
Average ..	0·3	0·2	0·5	2·5	7·0	35·1	40·7
Nilgiris—							
Nilgiris	1·3	1·0	1·4	3·6	6·0	9·4	14·5
Average ..	1·3	1·0	1·4	3·6	6·0	9·4	14·5

***Statement of monthly average rainfall in the Province*—cont.**

Names of districts.	August. (9)	September. (10)	October. (11)	November. (12)	December. (13)	Total. (14)
Northern Circars—						
Vizagapatam	6·7	7·7	7·4	3·0	0·6	41·4
East Godavari	6·2	6·9	8·5	4·3	0·4	41·8
West Godavari	7·1	7·0	6·8	3·2	0·2	40·7
Kistna	6·5	6·2	6·1	3·3	0·3	37·0
Guntur	4·9	5·7	6·2	4·0	0·5	32·4
Average ..	6·3	6·7	7·0	3·6	0·4	38·7
Deccan—						
Kurnool	4·0	5·3	3·8	1·8	0·3	24·2
Bellary	3·5	5·3	3·8	1·4	0·2	22·4
Anantapur	3·3	5·3	4·0	1·9	0·3	22·4
Cuddapah	4·0	5·0	5·0	3·7	0·9	27·1
Average ..	3·7	5·2	4·2	2·2	0·4	24·0
The Carnatic—						
South Arcot	5·4	5·7	8·9	10·9	5·4	46·8
Chingleput	5·0	5·2	10·2	12·1	4·6	46·8
Nellore	2·9	4·1	8·9	9·3	2·6	35·5
Average ..	4·4	5·0	9·3	10·8	4·2	43·0
The Central districts—						
North Arcot	5·3	6·5	6·5	6·4	2·3	37·9
Chittoor	4·1	5·4	6·1	6·0	1·8	33·7
Salem	4·3	5·3	6·1	4·0	1·2	32·6
Coimbatore	2·1	2·9	6·6	4·4	1·4	27·4
Trichinopoly	3·7	4·9	7·1	5·9	2·7	34·2
Average ..	3·9	5·0	6·5	5·3	1·9	33·2
Southern districts—						
Tanjore	3·8	4·2	8·2	11·6	6·9	45·1
Madura	2·7	3·5	7·3	6·1	2·3	32·3
Ramnad	2·4	2·8	7·1	7·1	3·5	32·3
Tinnevelly	0·8	1·1	6·7	7·9	4·4	30·4
Average ..	2·4	2·9	7·3	8·2	4·3	35·0
West Coast—						
Malabar	18·6	8·3	10·6	5·4	1·0	121·1
South Kanara	28·7	12·4	9·2	3·2	0·6	149·4
Average ..	23·7	10·4	9·9	4·3	0·8	135·3
Nilgiris—						
Nilgiris	10·6	7·1	10·0	6·9	2·6	74·4
Average ..	10·6	7·1	10·0	6·9	2·6	74·4

Appendix No. 2

[Referred to in paragraph 20]

Growth of population in Madras Province, 1891–1941

Names of districts. (1)	Population in 1891. (2)	Population in 1901. (3)	Population in 1911. (4)
1 Vizagapatam	2,788,031	2,983,213	3,134,820
2 East Godavari	1,331,350	1,466,179	1,652,859
3 West Godavari	765,245	860,960	980,323
4 Kistna	760,793	883,178	1,017,212
5 Guntur	1,316,204	1,490,635	1,697,551
6 Nellore	1,240,241	1,274,831	1,328,152
7 Cuddapah	882,762	880,080	893,938
8 Kurnool	817,811	872,070	935,259
9 Bellary	880,950	947,214	969,436
10 Anantapur	862,640	933,757	963,223
11 Madras	452,518	509,346	518,660
12 Chingleput	1,201,183	1,310,106	1,406,008
13 Chittoor	1,165,415	1,227,437	1,296,263
14 North Arcot	1,597,696	1,696,015	1,903,439
15 Salem	1,758,588	1,987,532	2,066,080
16 Coimbatore	1,776,569	1,958,716	2,094,066
17 South Arcot	1,957,448	2,105,809	2,362,566
18 Tanjore	2,230,930	2,248,051	2,366,045
19 Trichinopoly	1,640,457	1,716,340	1,862,446
20 Madura	1,506,054	1,676,128	1,891,529
21 Ramnad	1,458,946	1,524,713	1,664,101
22 Tinnevelly	1,535,442	1,663,312	1,796,191
23 Nilgiris	101,138	112,882	118,618
24 Malabar	2,648,172	2,795,738	3,015,099
25 South Kanara	1,056,081	1,134,713	1,195,227
Total	33,732,664	36,258,955	39,129,111

	Population in 1921. (5)	Population in 1931. (6)	Population in 1941. (7)
1 Vizagapatam	3,168,216	3,484,703	3,845,944
2 East Godavari	1,673,968	1,920,582	2,161,863
3 West Godavari	1,051,442	1,223,056	1,380,088
4 Kistna	1,081,872	1,254,208	1,444,294
5 Guntur	1,809,574	2,035,660	2,277,283
6 Nellore	1,385,553	1,486,222	1,617,026
7 Cuddapah	887,929	949,397	1,056,507
8 Kurnool	914,890	1,024,961	1,146,250
9 Bellary	862,370	969,774	1,051,235
10 Anantapur	955,917	1,050,411	1,171,419
11 Madras	526,911	647,230	777,481
12 Chingleput	1,493,058	1,655,115	1,823,955
13 Chittoor	1,322,664	1,447,103	1,632,395
14 North Arcot	2,002,087	2,266,989	2,577,540
15 Salem	2,135,799	2,433,972	2,869,226
16 Coimbatore	2,196,083	2,445,064	2,809,648
17 South Arcot	2,320,085	2,454,507	2,608,753
18 Tanjore	2,329,915	2,385,920	2,563,375
19 Trichinopoly	1,937,318	1,944,315	2,194,091
20 Madura	1,972,602	2,164,677	2,446,601
21 Ramnad	1,718,187	1,838,955	1,979,643
22 Tinnevelly	1,907,314	2,046,907	2,244,543
23 Nilgiris	126,519	169,330	209,709
24 Malabar	3,098,871	3,533,944	3,929,425
25 South Kanara	1,247,368	1,372,241	1,523,516
Total	40,126,512	44,205,243	49,341,810

Appendix No. 3

[Referred to in paragraph 27]

Density of population

(Districts arranged in descending order)

Names of districts. (1)	1901. (2)	1941. (3)	Per cent increase. (4)
East Godavari (Plains)	506	714	41·1
Tanjore	601	686	14·4
Malabar	483	679	40·6
South Arcot	500	620	24·0
Vizagapatam	469	605	28·9
Chingleput	424	593	39·9
West Godavari	365	567	55·3
North Arcot	365	552	51·2
Tinnevelly	384	515	34·1
Trichinopoly	396	506	27·8
Madura	343	501	46·1
Kistna	259	413	59·4
Ramnad	316	408	29·1
Salem	282	406	44·0
Coimbatore	276	395	43·1
Guntur	259	393	51·7
South Kanara	282	377	33·7
Chittoor	208	274	31·73
Nilgiris	115	212	84·3
Nellore	160	204	27·5
Bellary	166	184	10·8
Cuddapah	149	178	19·5
Anantapur	139	174	25·2
Kurnool	116	150	29·3

APPENDIX NO. 4

[Referred to in paragraph 36]

Statistics of deaths from principal causes during the last ten years

—	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Cholera	34,456	34,117	23,307	10,252	* 2,115	6,418	3,510	52,381	117,039	18,318
Small Pox	12,330	4,581	2,446	2,273	3,120	4,310	2,755	3,413	7,925	19,776
Plague	645	615	1,127	1,155	*324	1,169	1,726	701	4,885	1,738
Fevers	315,998	271,668	286,694	282,708	307,942	301,127	301,517	287,944	301,775	344,315
Dysentery and diarrhoea	96,181	84,313	84,276	74,064	84,906	86,444	98,464	88,570	93,446	97,004
Respiratory diseases	102,843	93,842	95,906	96,420	102,130	99,676	103,766	96,157	106,271	111,842
Maternal causes	14,439	13,536	14,589	15,392	15,448	14,939	15,906	14,687	18,467	15,112
Other causes	547,444	521,167	546,085	549,788	595,296	583,857	603,193	576,276	625,879	683,313
Total ..	1,124,336	1,023,839	1,054,430	1,032,052	1,111,281	1,097,940	1,135,837	1,120,129	1,270,687	1,291,418

(From Annual Reports of the Director of Public Health, 1935 to 1944.)

* The year 1939 recorded the lowest mortality from cholera during the last 62 years and from plague since 1898 when it first occurred in this Province.

Appendix No. 5

[Referred to in paragraph 117]

Productive irrigation works in the Province

Name of system.	Year operated.	Districts where irrigated.	Capital outlay including arrears. of interest.	Area irrigable by the complete project.
(1)	(2)	(3)	(4)	(5)
			RS.	ACS.
Cauvery delta system	1889	Tanjore and Trichinopoly.	85,56,832	908,374
Srivaikuntam anicut system ..	1889	Tinnevelly	17,75,063	26,000
Godavari delta system	1890	West Godavari and Kistna.	1,94,61,702	840,000
Mehamattur anicut system ..	1891	South Arcot	87,184	5,200
Thadapalli channel system ..	1893	Coimbatore	1,77,446	19,332
Kalingarayan channel system ..	1893	Do.	1,80,486	11,843
Vriddachalam anicut system ..	1893	South Arcot	1,08,204	15,559
Chembrampakkam tank system.	1893	Chingleput	7,64,143	5,411
Marudur anicut system	1893	Tinnevelly	60,122	17,920
Pennar river canal system ..	1894	Nellore	70,60,862	170,000
Arkenkota channel system ..	1894	Coimbatore	1,44,445	5,000
Tirukkoyilur anicut system ..	1895	South Arcot	3,99,190	28,000
Shatiatope anicut system ..	1895	Do.	10,89,561	34,000
Cheyyar anicut system	1896	North Arcot	5,39,999	23,629
Cumbum tank system	1896	Kurnool	86,373	6,000
Poiney anicut system	1897	Chittoor and North Arcot.	3,03,918	23,324
Periar anicut system	1897	Madura and Ramnad.	1,08,35,054	143,000
Kistna delta system	1898	West Godavari, Kistna and Guntur.	2,25,20,377	968,000
Nandiyar channel system ..	1899	Trichinopoly	65,715	7,296
Lower Coleroon anicut system ..	1903	South Arcot and Tanjore.	30,01,669	110,308
Kistna East Bank canal extension system.	1918	Kistna	58,08,380	88,000
Polavaram island system ..	1934	East Godavari ..	16,99,274	17,500
Cauvery-Mettur system	1934	Tanjore	6,48,92,152	332,000
Kattalai system	1929	Trichinopoly	41,27,567	72,207
		Total ..	15,37,45,818	3,877,902

Appendix No. 6

[Referred to in paragraph 118]

Unproductive or protective irrigation works in the Province

Name of system.	Year operated.	Districts where irrigated.	Capital outlay including arrears of interest.	Area irrigable by the complete project.
(1)	(2)	(3)	(4)	(5)
			RS.	ACS.
Kurnool-Cuddapah canal ..	1883	Cuddapah and Kurnool.	2,34,00,765	130,282
Barur tank	1888	Salem	4,52,037	6,887
Vallur anicut	1893	Chingleput	76,282	5,216
Madras water-supply and irrigation system.	1890	Do.	18,68,918	9,852
Pelandorai anicut system ..	1893	South Arcot	6,92,074	16,000
Palar anicut system	1896	Chingleput and North Arcot.	24,89,275	82,718
Chicacole minor river system ..	1900	Vizagapatam	2,89,226	67,000
Muniyeru system	1902	Kistna	6,09,601	10,580
Dondapad tank	1903	Guntur	1,40,004	250
Yerur tank	1907	Nellore	63,353	1,470
Sagileru system	1907	Cuddapah	1,64,727	4,500
Atmakur tank	1907	Guntur	1,25,403	460
Jangamaheswarapuram tank ..	1908	Do.	71,664	290
Anamasamudram Beraperu tank.	1910	Nellore	73,573	1,000
Hajipuram tank	1911	Do.	3,11,883	700
Ponnalur tank	1911	Do.	2,18,649	1,000
Markapur tank	1911	Kurnool	1,29,340	1,701
Nagavalli river system	1918	Vizagapatam	17,87,066	27,658
Venkatapuram tank	1918	Kurnool	3,84,921	340
Bhavanasi tank	1919	Guntur	2,65,491	841
Yellanur tank	1919	Anantapur	2,69,707	925
Panjapatti reservoir system ..	1919	Trichinopoly	3,39,276	2,500
Siddapur tank	1919	Kurnool	8,04,486	1,000
Nagavaram anicut and supply channel.	1919	Cuddapah	1,09,890	894
Mopad reservoir system ..	1921	Nellore	23,47,820	12,500
Kanniyampalayam anicut ..	1922	Coimbatore	1,11,074	400
Tholudur reservoir system ..	1925	....	26,22,781	..
Thippayapalem project	..	Kurnool	5,84,216	..
Basavanna channel	..	....	5,89,780	..
Duvvaleru project	..	....	1,47,515	..
Uduthorabhalla scheme	1943	Coimbatore	7,484	800
Mahadevapuram tank project ..	1943	Godavari	9,269	1,500
		Total ..	4,18,57,550	

APPENDIX No. 7

[Referred to in paragraph 120]

Note on minor irrigation works

Minor irrigation works play a large part in the welfare of the people. They are scattered all over the countryside and almost all of them are of very ancient origin. It is difficult, at this distance of time, to say whether all or any of them have been dug by man or whether they are merely depressions where water had collected and where in order to impound such water bunds had been put up from time to time. The chances are, that tanks are of both kinds. The larger tanks especially should have been the result of vast human labour such as could be commanded by the kings in the earlier epochs of Indian History. The one point that is indisputable is that no tank has been dug within recent memory. In this respect, the minor irrigation system presents a striking contrast to the major systems of irrigation.

2. It is also a point to note that unlike in the large systems of irrigation the problem with minor irrigation works is not primarily one of extension and development, but the very urgent one of conservation and maintenance, prevention of retrogression and the restoration of works to a certain minimum standard of efficiency : for, minor irrigation has a productive as well as a protective value. It is perhaps in this view that there is a justification for not keeping capital and expenditure accounts separately for minor irrigation works. The protective aspect of minor irrigation was noticed as early as 1878 by the Famine Commission, who, speaking generally, said that the true value of irrigation works is to be judged by the direct protection afforded by them in years of drought by the saving of human life, by the avoidance of the loss of revenue remitted and of the outlay incurred in costly measures of relief. Further, minor irrigation tanks are usually to be found in areas where other sources of water-supply are rare and secondly, even from a non-agricultural point of view, water for cattle as well as for the consumption of human beings, is in many places afforded by these tanks. From an administrative and agricultural point of view, the very vastness of their number invests them with considerable financial importance to the ryot as well as to the Government. The Irrigation Commission of 1901–1903 have estimated the number of tanks at not less than 40,000 including small river works in the figure. It is very doubtful if this number has increased since then. The chances are, on the other hand, that a certain percentage of the works has ceased to be sufficiently useful.

3. There is a general concensus of opinion among officers who have dealt with the maintenance of minor irrigation works and among the intelligent lay public that there has been systematic deterioration, showing itself in the neglected condition of the supply channels and the unremitting silting up of the bed level of the tanks and in a general insufficiency of the water for the ayacut determined by the Tank Restoration Scheme Party and registered as such for each tank. A great deal of remission is being allowed even in respect of tanks which, from a technical point of view, conform to the standards mentioned by the Tank Restoration Scheme Parties. This happens even when there is an adequacy of rainfall in that tract, and in spite of the rules for remission being fairly stringent. In one and the same village, differences are noticeable between tank and tank, depending on the extent of foreshore cultivation. Figures gathered from the No. 20

and No. 5 (Rainfall and Remission) accounts of certain villages substantiate this statement. It is safe to assume that, if not merely, total loss of crop but partial losses which are not benefited by remission rules and secondly the fact that in almost all the ayacuts under the minor irrigation tanks, irrigation is supplemented to a considerable extent by draw-wells are both taken into account, then, the deterioration in the minor irrigation system has undoubtedly been considerable. Figures for remission all over the Presidency are not readily available, but even such figures as are available will show that remission is given when there is no failure of rain. This can only be due to defects in individual tanks. It is this difference between tank and tank in a particular tract as well as the general decay of the system that requires investigation.

4. Historically, the importance of minor irrigation works was brought to light by the Famine Commission of 1878. Even at that time the Commission felt that the tanks were deteriorating and that it was necessary to adopt a systematic policy of maintenance. The Commission made certain recommendations to this effect, the chief among them being the creation of the Tank Restoration Parties. It is interesting to note that it was the Famine Commission that first adumbrated the policy of handing over tanks that have an ayacut of less than 200 acres to the Revenue department. The Commission also recommended that smaller tanks irrigating not less than 50 acres should, after being brought up to the standard, be made over to the villagers and that tanks watering less than this area should be handed over to the villagers as they were and that finally tanks irrigating less than 10 acres should be handed over to the ryots without any wet assessment being charged for irrigation under them. These last recommendations of the Commission do not appear to have been carried out. The important recommendation of the Commission, namely, the creation of a technical staff to bring the tanks to a certain standard, was given effect to early. The Tank Restoration Scheme was commenced in 1883 in the Madura district, and since then was extended to other districts. Most of the minor irrigation basins have now been surveyed and memoirs prepared for them. The method adopted by the Tank Restoration Scheme Party is briefly as follows: Survey parties were formed for the purpose of preparing a detailed record of all the works in each main drainage line. A map was then prepared for each minor basin showing all the minor basins with groups and sub-groups, each work being surveyed and its catchment area worked out and recorded. Detailed maps were then prepared for the minor basins showing the position of each work with longitudinal sections of all tanks, detailed sketches of masonry works and notes indicating the work to be done to put each work and channel into repair. Statements of financial and hydraulic details were then prepared with a descriptive memoir of each work in which information was given as to standard levels, flood discharges, storage capacity, etc. Finally estimates for the repairs to be executed were prepared. These particulars excepting the detailed estimates have been embodied in the memoirs. In the beginning of the century, the Irrigation Commission reviewed the work of the Tank Restoration Scheme Parties and recommended a vigorous prosecution of the scheme. The repairs suggested by the Tank Restoration Scheme Party have been carried through in most cases. The present technical position of the minor irrigation works is conditioned by the memoirs of the Tank Restoration Scheme Party where they exist. In other words it is the Tank Restoration Scheme Party standard that is being maintained at the present day. Administratively, a general

policy of limiting the expenditure on a particular work to five times the revenue derived from its ayacut is being followed, though, of course, in special cases this rule is relaxed. Tanks having more than 200 acres ayacut are under the charge of the Public Works Department while tanks having an ayacut of less than 200 acres are under the control of the Revenue department, the technical aspects of the maintenance of the latter tanks being in charge of the minor irrigation staff, the Public Works Department being consulted wherever necessary.

5. It is easy to see that this system of maintaining the tanks by reference to Tank Restoration Scheme memoirs leaves much to be desired. It does not appear that the question of providing a permanent technical staff for not merely keeping up the Tank Restoration Scheme standards but for the more important purpose of altering the Tank Restoration Scheme memoirs to suit the changing conditions was ever considered. In this connection, the analogy of the Settlement Party which forms part and parcel of the revenue administration of the country is relevant. It is recognized that once in thirty years conditions with respect to price level, yield of crops and other circumstances that influence the price of produce necessitate a revision of the land revenue settlement. The existence of the Settlement Party helps in the incidence of revenue conforming to altering economic conditions. But it is a grave defect in the administration of minor irrigation works that since the Tank Restoration Scheme Party, which may be compared to the original Settlement Party, prepared the memoirs, no such permanent technical machinery has been kept going in order to provide for altering conditions. The necessity for such a staff was felt by Colonel Smart, the then Chief Engineer in Madras, in his evidence before the Irrigation Commission. The relevant portion of his evidence is as follows :—

"No satisfactory system of maintenance after a work has been placed in thorough order under this system has yet been devised without which it is a matter for serious consideration whether we should go on spending large sums on earthwork of tanks which without up-keep deteriorate year after year and will again in five or six years require repairs. The subject is one of great importance and may be dealt with at an early date by the Revenue and Public Works departments. It is possible that nothing can be done without legislation."

It is true that Colonel Smart was merely referring to the necessity for the establishment of a proper irrigation staff, a defect which has to some extent been remedied by the establishment of the Minor Irrigation Staff; but it cannot be denied that he was troubled by the absence of a technical machinery which would make the memoirs and other repairs conform to the supply of water into a tank on the one hand and the needs of the ayacut on the other. The consequence is that, at the present day, repairs are being conducted so as to conform to hold and out-of-date irrigation memoirs, which in view of the fact, that neither the supply of water into the tanks nor the capacity of the tank to hold water are the same as they were when the memoirs were prepared, renders a great deal of the work done in repairing the bunds and sluices of tanks of very little use to the ryot. This goes to the root of the defect, and therefore requires to be examined in greater detail.

6. Starting from the beginning, it may be seen first that rainfall to-day is not what it was about thirty years ago. Many of the irrigation memoirs are at least thirty years old, though some are of later origin. For example, the Tank Restoration Scheme Memoir for Krishnagiri taluk

was prepared in 1892–93. The average rainfall on which the Tank Restoration Scheme figures are based was then 43·40 inches. The average rainfall for the last 20 years is 32·73 inches showing a decrease of nearly 10 inches. It can also be stated that during the major portion of 12 years, i.e., 1918, 1920, 1923, 1925, 1927, 1928, 1929, 1931 and 1935, the rainfall has been very much less than average, working up only to 23·43 inches. This is another important fact, for, if in a period of 20 years two-thirds of the periods shows less than the average, it cannot be said that the average is a very true one or that the advantage of having good rains during one-third of the period is very considerable, for the waters cannot be stored up to be of any use to the ryot in any subsequent year. Further, the heaviest rainfall recorded in 24 hours in the year 1892 was 5·9 inches. Subsequently, this figure has fallen to 4·5 inches in the years 1930–32 and 1934. During the other years it has never exceeded 3 inches. These figures taken for Krishnagiri taluk may be compared with figures for other tracts in the Presidency and it is doubtful if they will not be supported by similar conditions. There are various reasons for this decrease, such as disafforestation and the conversion of large areas of well wooded lands into arable lands and there are also perhaps other reasons of a meteorological nature : but the fact of decrease is any how clear and from the point of view of the minor irrigation tanks, this naturally means a lesser supply than before. Too much reliance cannot be placed on the rainfall statistics available in the various rain-recording stations. The main stations are the taluk offices. It cannot be said that the rainfall recorded at the taluk office gives a correct idea of the rainfall of the entire taluk. To begin with the policy of establishing these recording stations not by reference to any meteorological considerations, but by reference to administrative convenience is itself one of very doubtful wisdom. There are some natural points of vantage in each small tract of country and rainfall should be recorded at such points. These sometimes depend on the contour of the country and the alignment of its hills and there is every likelihood of there being vast differences in the amount of rainfall within very short distances. This is especially observable in Krishnagiri taluk where the rainfall in the Barur area for instance and the Maharajagadai valley, though within a distance of 10 miles, certainly exhibits vast differences. Therefore, the diminution of rainfall which has been noticed above will have to be viewed with the qualification that while it is true for the region immediately surrounding Krishnagiri itself, it is by no means a true indication of the rainfall in the whole taluk. There are regions in the taluk the rainfall of which is much less.

7. Secondly, even such of the water as falls on the catchment area of Minor Irrigation tanks does not reach the tanks because of extensive cultivation in the catchment area. Originally, most of the catchment area consisted of jungly uncultivated and hard soil and all the water falling on it reached the tank. The amount of soakage was negligible. With the pressure of a growing population on the soil practically the entire catchment area of the tanks has become cultivated. The greater the density of the population and the rate of acceleration of the increase in population the more is the tendency to reach out for lands of lesser fertility and lands which at an earlier time had been left waste, even deliberately either for the use of the community for such purposes as grazing or in the foreshore of tanks in order to allow free flow of water to the tanks. It is difficult to dispute this fact that foreshore cultivation

is by no means ancient and considering that the foreshore of a tank is usually favourably situated from the point of view of the agriculturists, the long continued abstention of the villager from cultivating such lands can only be due to a certain amount of foresight and deliberate understanding of the harmfulness of such cultivation. At the present day however the catchment areas of the tanks right up to the foreshore in many cases are fast being brought under cultivation, though some of these upper catchment lands are infertile. An investigation of the Maharajagadai valley of Krishnagiri taluk for instance, shows that lands lying on the very slender margin of profitableness have been brought under cultivation in recent years. The catchment of the upper tanks in this valley lies in the vicinity of reserve forests and population is not very dense in the valley and yet pressure on the soil is felt very acutely. In the same valley lower down population is pressing on the soil to such an extent that cultivation has reached the hill slopes that lie in the foreshore of some of the tanks. From the point of view of water supply to the tanks this ploughing up of the catchment, up to the foreshore, leads to the soil becoming loose and getting washed down into the supply channels and blocking the free passage of water into the tanks. It is a well-known fact that the supply channels themselves are not being attended to by the ryots whose duty it is to attend to them. There are various reasons for this neglect, such as the breaking up of the old communal life in the villages, but whatever the cause, this neglect is an important problem that has to be faced.

8. It has been seen that there is first a reduction in the rainfall and second that even such of the rain as falls on the catchment does not reach the tanks. The third feature to be observed is that the tanks are unable to retain even the water that reaches them. This is due to the silting up of the bed level of these tanks. From a laboratory point of view this silting up can be studied in the smaller tanks. It is true that the problem arises in connexion with the big as well as the small tanks, but it is easier to study it in the small tanks as in the case of large tanks the vastness of the size of the tank bed to some extent masks the rate at which the silting up is going on. It is observed curiously enough that this silting does not spread uniformly all over the bed of the tank; on the other hand, it appears to follow certain natural lines of flow of the incoming water so that we find that the silting up is first in a series of mounds and then, when the low level spaces between these mounds get filled up, entirely on one side of the tank. There is no doubt that side by side with this, there is an imperceptible increase in the bed level all over the entire area also but the existence of the feature mentioned above more or less divides the tanks into two parts a high level and a low level part, thus reducing the effective storage capacity of the tank. It is to be observed that this tendency for the bed level to rise is more noticeable near the surplus weir. In some cases where the ridge formed by the inflow of sand and earth has not had time to assert itself the tank bed is full of water in small pockets which are surrounded by these ridges. This water does not reach the sluice, so that at any time of low rainfall the ayacut is not benefited. Three tanks were studied with special reference to the problems mentioned above. Venkatagoundan tank in Kamandoddi village in Hosur taluk, Chinnampalli tank of Kammampalli and Kannandahalli big tank in Krishnagiri taluk. In respect of Chinnampalli tank, in order to find out the extent to which this silting up has gone and the consequent reduction of the storage capacity, complete levels were taken and the result shows that the dates

given in the Tank Restoration Scheme Memoirs are thoroughly unreliable if the present position is taken into account. The tank has an ayacut of 11 acres but taking the existing capacity, and a duty of 5 acres per million cubic feet of water which is equivalent to a duty of 60 acres to a cusec to a base of 140 days, the tank can command only 3 acres. As a matter of fact, it is getting one filling as against four fillings mentioned in the memoir. Even if two fillings are taken into account the tank can irrigate only 6 acres. It is thus indisputedly clear that about 50 per cent of the ayacut is beyond the irrigable capacity of the tank. This silting up and consequent reduction in capacity often leads, especially in the case of tanks getting one or two fillings, to the peculiar position of the tank itself surplussing without being of any real use to the ayacut. In the remission accounts of many villages one is often puzzled by the remark that the tank surplussed but that at the same time the ryots complain that there was not sufficient water for the lands. As a matter of fact with the reduced capacity and a flood tank level which is fixed, the tank is bound to surplus even with a reduced supply and the complaint of the ryot that this surplussing has not been of much use is a true and correct one.

9. This silting up of the tanks would appear to be an old phenomenon. It was noticed as early as 1878 by the Famine Commission. There is not much doubt that in years gone by, the tanks must have been very much deeper than that they are now and that they must have had greater capacity. If the Commission of 1878 noticed that the beds of the tanks were getting silted up, then it is not necessary to emphasize that since then there must have been silting up at an alarming rate. Taken by itself, this silting up of the bed level is a problem of greater importance than any other single problem connected with the minor irrigation system. Even now the process is going on unchecked with the result that many tanks are gradually getting abandoned as they are fast approaching the level of the surrounding roads side. If this process goes on unchecked it is not impossible to visualize that within the next 30 or 40 years a great many of the existing tanks will cease to be in use and will therefore have to be abandoned. In that case, one might very well ask whether there is any purpose at all in the vast expenditure that goes on year after year in repairing the bunds and sluices of minor irrigation works. The causes of this silting up are apparent. It is due to the constant washings of earth from the catchment area, a process which has been accelerated in the recent past, as has already been noticed, by the conversion of the uncultivated and jungly areas in the catchment into ploughed arable land. The problem, however, is so vast that on the face of it, it appears almost impossible to find a right solution for it. As a matter of fact, the very vastness of the problem may be a cause of its not having been considered so far. It has been pointed out by certain technical experts that when the run-off of the catchment of a tank is large in comparison to the tank capacity as in the case of the first tank in a chain of tank so that the tank surpluses freely and for long periods, then it is possible that a proportion of the light silt in suspension will be passed off with the surplus water. This, however, touches only the fringe of the problem because it only affects the lightest silt in suspension and it is anyway injurious when the surplus of one tank forms the supply of another. This chain system of tanks is not uncommon. As a matter of fact, when there is a chain arrangement of tanks, the first tank the catchment of which is to supply a number of tanks lower down brings such a large

amount of silt; that the silting up of the first tank is very great. The only method of studying the problems of the tanks is by taking up chain by chain. Most tanks in South India form a link in such a chain and the problems affecting each chain are certain to be peculiar. In the case of one chain the predominant evil will be foreshore cultivation with ill-defined and haphazard water courses supplying tank after tank. In another chain there may be defined channels, the surplus of one tank leading on to another, and here the problem of the silting up of these supply channels is very important. While, therefore, the general features will remain the same in most tanks, alteration of emphasis will be found in individual chains and tanks, and consequently each chain will have to be studied by itself. In all these chains, the most important problem to tackle is in respect with the first tank in the chain. In the case of such a tank, the evil of foreshore cultivation is fraught with great danger as it will affect a very large number of tanks lower down. With respect to the general problem of silting up Col. Ellis in his Manual of Irrigation, remarks "many of the tanks have been impounding silt for centuries and have lost very considerable proportions of their original capacities to the great injury of the crops under them. No effective remedy for this has been discovered and the problem is one which becomes increasingly serious as time goes on."

10. On the technical side the capacity of the tank was fixed by the Tank Restoration Scheme Party, by adopting what are known as "Dickens" or "Ryves" formulæ. Both of these briefly stated are as follows:—D.C.M.P. where (D) is the maximum flood discharge, (M) is the area of the catchment in square miles and (P) is a power less than unity and (C) a coefficient fixed with reference to the nature of the catchment and the intensity of recorded rainfall and with records of actual floods in parts of the same area in similar catchments. In Madras Province (P) is taken to be either as two-thirds or three-fourths of unity, as a rule, and the coefficient (C) at a numerical figure between 300 and 500. It is indisputable that none of these figures adopted for working out this formulæ can be the same to-day as they were about 25 years ago. As has been seen above (D) which is the maximum flood discharge is altered by the diminution in rainfall. The effectiveness of the supply to the tank has also been diminished. The coefficient has therefore to be altered. It is immaterial whether it is (P) that is lessened or (C) but undoubtedly in interpreting the formula the numericals have to be changed. The original figures adopted do not give a correct account of the volume of water that flows into the tank from the catchment area. But the figures now adopted for repairing the tanks are based on the formula as worked out above by the Tank Restoration Scheme Party, in most cases, thirty years ago. Further, the Tank Restoration Scheme Party have fixed the full tank level with reference to mean sea level and the surplus weir of a tank is fixed at this height. The maximum water level of a tank is fixed by reference to the head of flow over the surplus weir and is usually between one and two feet above the full tank level. The height of the bund is further calculated to provide for at least three feet above the maximum water level. The sluices of a tank are further fixed at such a level in the bed that they command the maximum ayacut proposed under the tank. Now it is easy to see that if the full tank level of a tank is of a fixed height and the bed of the tank goes on rising, then very much more water should now be flowing out of the tank through the surplus weir than before,

because, obviously the capacity of the tank is less than what is used to be, due to silting. The capacity of a tank is calculated by the formula one third area of the waterspread multiplied by the depth of water at the full tank level over the silt of the sluice, taking it as the cone as shown below in figure 1.

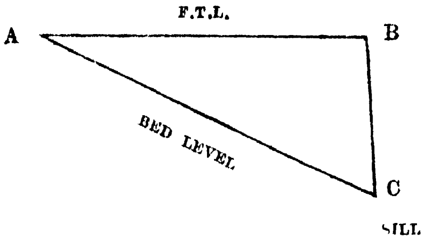


FIG. 1

If the bed of the tank is as shown in figure 2 below then the capacity of the tank will not be affected as the water in the concave portion will remain in the tank itself.

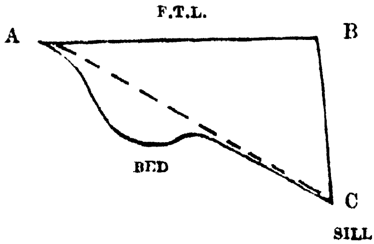


FIG. 2

This however, is not what we see. On the other hand, the silting up noticed in paragraph 8 creates various patches in the beds and is more as given in figure 3 below.

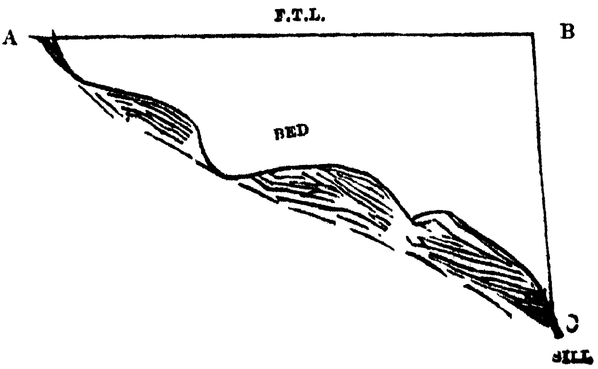


FIG. 3

This naturally reduces the capacity of the tank if the formula mentioned above is used, taking the full tank level as a fixed height over the mean sea level. It may be argued that the capacity will not be altered but that there will be a greater extent of foreshore submersion. This is quite wrong for what will happen is, not a greater extent of foreshore submersion, but greater escape of water over the surplus weir.

11. It was noticed above that the sluices of a tank are fixed by reference to the highest land fixed for the ayacut, but as a result of the constant silting up of the bed we find that in many tanks the sill of the sluice is very much lower than the bed level. In many instances the water has to fall down to the sill to a depth of 4 to 5 feet carrying with it the silt. The tunnels of the sluices are usually small, in some cases 9/3". The general result is that the barrel is often checked with silt. This is one aspect of the problem. The other is the existence of water in the tank, but as a result of the silting up of certain portions of the bed, the water not reaching the sluices. This latter is a very widespread phenomenon and is due also to the reduced capacity of the tank, the original ayacut being far too extensive and the sill of the sluice being placed at a high level. This is specially to be seen in large tanks where the original vast supply justified the placing of the sluice at a fairly high level. In such cases a low level sluice is called for. Now the ryots generally bale out this water or dig leading channels towards the sluices but this in turn leads to the deposit of more mud, in the sluices. These defects in the sluices will clearly show the need for a revision, and for fixing the sluices at more favourable spots. The original calculation of the capacity of the tank as one-third area of waterspread multiplied by full tank level height from sill level will now have to be worked out with respect to different figures. Theoretically no doubt the raising of the sill level of the sluice will lead to the possibility of extra land of higher levels being brought under the ayacut but it is most important to note that the raising of the sluice is due to another consideration as a result of reduced receipt of water into the tanks. So paradoxically enough what is called for is raising the level of the sluice and lessening the extent of the ayacut in most cases, with the exceptions mentioned above.

12. The remedies to be suggested for improving the condition of the tanks fall under two heads, first, those that can be carried out by local officers even by conforming to the existing rules and by the mere expenditure of a certain amount of extra zeal and diligence and second; those that call for legislative changes and important alterations of policy. The former are obviously within the realm of immediate practicability. But they only touch the fringe of the problem and it is by a bold policy of radical change with respect to fundamentals that any lasting benefit can be achieved.

13. The first remedy lies in the prevention of indiscriminate foreshore assignment. As has already been pointed out, a great deal of the original catchment area of the tanks that used to be uncultivated jungly land has now been brought under cultivation. As this catchment area approaches the foreshore this evil increases in proportion, so far as the tanks are concerned. The cultivation in the foreshore itself sends down silt into the tank directly and if further narrows the waterspread by encouraging small and apparently petty encroachments that have a tendency to corrode by imperceptible degrees till a final dimension of dangerous proportions is reached. This, in addition to the bunding up

of the foreshore, does not allow the water to flow into the tank freely from the catchment area. This is the case, when as most frequently happens, intensive crops like paddy and vegetables are grown. The question arises whether such wholesale prevention of all assignments either in the foreshore of a tank or in the more extensive regions above comprised in the catchment area are possible, and secondly whether it is possible to demarcate certain portion of foreshore as definitely objectionable. On the face of it, it would appear that it is difficult to define the limit or the possibilities of restriction but bearing in mind the main principle of the inadvasibility of foreshore assignment each individual case will have to be dealt with on its merits. It may, however, be pointed out that lands which are sloping towards the supply channel on either side of it should, as far as possible not be assigned, as also those lying on that part of the foreshore from which the undefined supply to the tank which does not come direct through the supply channel flows. Lands which are registered as tank-bed should be zealously guarded and any cultivation in them evicted straightaway. Lands found registered as "poramboke" should be retained as such and if privately owned already should be given a dry classification and wet cultivation discouraged emphatically. In resettlement operations the practice of not registering any foreshore land under the sources in question and of generally retaining such lands as "dry" is being followed but sometimes they are registered as wet under a different source. Even this would appear to be dangerous and may be avoided in the interests of the tank. These suggestions are made with reference to lands which are either now registered as poramboke or which are at the disposal of the Government.

14. In respect of the lands which are already privately owned the desirability of encouraging dry crops alone as already mentioned in the previous paragraph may be considered, the reason being that cultivation which is not very intensive is less likely to impound a great deal of water or to loosen up the soil to a very considerable extent. Following the same principle it may be stated that in such lands in preference to cereals or pulses, encouragement of gardens and tope cultivation in general will be a beneficial policy because then there will be less corrosion of the surface soil. In carrying out this policy it is certainly to be remembered that the pressure of a growing population on the soil has to be reckoned with and that any how the areas under cultivation have to be increased. Since the foreshore of all the tanks, taken together with the catchment areas cover almost half the countryside, a severe and lop sided emphasis on the principles enunciated above is perhaps likely to affect the ryots. A certain extent of assignment is therefore to be taken as an evil to be acquiesced in, and mere concentration on providing for a good supply of water to the tanks rejected as the *reductio ad absurdum* of purblind enthusiasm. But topes should be encouraged. It has the further advantage of affording a much needed diversion from the blind pursuit of wet and dry crops and is in the long run likely to be more remunerative. It will be well to take statistics with the aid of the purpose in view, to begin with in the case of the bigger tanks having an ayacut of more than 100 acres. A register may be maintained on such lines. When these lands are owned by Government preferential assignment should be for tope cultivation. By propaganda and encouragement by liberal grant of loans, privately owned lands should also be brought under topes. The raising of a tope no doubt calls for capital and this may drive out

the needy villager who asks for assignment after a year or two of sivayi-jama cultivation as is happening now. It may, however, be possible to find lands for such persons elsewhere in the village. Further the larger land owners should first be approached to lead the way in this matter. There has, of late, been a tendency to grow mangoes and limes in many areas and all that will be necessary hereafter will be to give sufficient point and direction to this tendency. Another policy that can be tried is the conversion of foreshore areas into grazing ground and other communal porambokes wherever possible. In many villages grazing ground and other porambokes form quite a considerable extent. Where possible, these can be converted to unassessed and corresponding extents of unassessed lands in the foreshore converted into porambokes. This is unlikely to cause any hardship. In the case of privately owned lands, it will be worthwhile adopting a policy of exchange. The success of this policy, it is needless to state, will depend very largely on the enthusiasm and sympathetic propaganda of local officers. A further method of preventing foreshore lands from depositing silt into the tank is by the planting of "nanal" reeds. This can be taken up as part of the scheme of maintenance and will not involve any great financial outlay.

The importance of vari or water course porambokes is often not realized. The water supplies to a tank consist of a number of such streamlets that thread their way through the flowing contours of the countryside collecting the waters of the high level lands on the way. Officers have a tendency to isolate the actual vari and consider cultivation in the larger area registered as vari to be unobjectionable. This is a short-sighted view. In original settlement, it was apparently realized that the usefulness of a water course depended on the lands on either side of it to a certain breadth remaining uncultivated and on hard surface so that water may flow into the vari without any obstruction and without carrying loose earth. To this end, vari porambokes usually consist of larger extents than are occupied by the varis themselves. The present tendency to ignore this and to limit the vari poramboke to practically the actual vari with a small, very small extent on either side, is one that should be avoided.

15. The proper maintenance of supply channels is one of the most important remedies. These, it may be truly said, form the Cindrella of the Minor Irrigation system of South India. The protection of the supply channels consists of preventing their silting up and of clearing them periodically of jungly undergrowth. But this vital aspect of the maintenance of irrigation is now being left to the ryots. Theoretically, the principle of inviting the co-operation of the village community and of compelling the ryots to shoulder some liability, is justifiable, but if in practice the programme leads to nothing more than the periodical penalization of persistent neglect on the part of the ayacutdars, then it is high time that the policy is drastically altered. Especially so, when the work involved affects the vitality of the entire irrigation system. The Compulsory Labour Act is at the present day brought into operation only when the channel reaches a state of utter and terrible disrepair, till, in fact, it reaches a stage when it actually blocks the water coming into the tank. The consequence is that much of the work that is being done by way of repairing the bunds or the sluices goes to utter waste when the supply channel is neglected and periodically deposits a great deal of silt into the tank. The system of leaving the maintenance of

these channels to the ryots has not worked well. This is within the experience of every officer. It may be an unfortunate fact, but the sooner the inevitability of the danger if the present policy is followed, is realised, the better. The main reason for this, is the disintegration of the village community and the death of a common village consciousness and interest. This in turn is due partly to a policy of a spoon feeding and benevolence practised by the Government towards people who had been generally accustomed to look after themselves to a considerable extent and further to the increase of absentee landlords who have come to look upon agriculture not as a vocation or a method of living, but merely as a means of investment of money earned elsewhere in more profitable occupations away from the village community. This can be seen with great emphasis in villages where there is a preponderance of Brahman landlords. It is, therefore, very difficult to get together the villagers to co-operate and clear the supply channels especially in the case of large tanks and in the case of tanks whose ayacutdars live in 3 or 4 villages. Together with the application of the Kudimaramath Act only in extreme cases, which alone will justify the imposition of a penalty, the deterioration of the supply channels has been going on at an alarming rate. It may also be pointed out that even under the Kudimaramath Act when the work is done by the Department, the rates for even the clearance of under growth, are so high that above 4 or 5 hundreds of rupees are spent in many channels for this purpose, and the consequence is that the amount spent for the actual clearance of silt is very little. This aspect of the work is often only partially accomplished .Once it is recognized that village consciousness is dead and that absentee landlordism has come to stay then obviously the only remedy is to transfer this work from the ryots to the Government and to include the silt clearance in the supply channels as part of the regular work of maintenance. This will lead to the work being attended to with greater frequency, not merely at a final stage of disrepair. The Compulsory Labour Act has to be amended so as to provide automatically for the levy of a charge in respect of this work. The principle of the Government themselves undertaking a portion of such work has been recognized under the new accelerated programme.

16. To the idealist who is bent on rural reconstruction the idea of further sapping the already feeble self-reliance of the ryot is repugnant. But the death of " Kudimaramath " was forced on the attention of the Irrigation Commission more than thirty years ago. The Commission stated " We are repeatedly assured that the maintenance of the tanks was not satisfactory and that Kudimaramath was practically dead . . . We are ourselves reluctant to admit that so valuable an institution is really dead and past restoration." It will be idle to deny that the process has been proceeding since then with accelerated intensity. The Irrigation Commission as well as others have traced this to the policy of the State readily taking up the responsibility and readily taking action in matters where, in an earlier day, the ryots had to look after themselves, but as noticed above, this is but one side of the question as it neglects to emphasize the breaking up of the communal life in villages and the increase of absentee landlordism. Even if it is accepted as true, the State cannot at this distance of time, revert to the *status quo ante* and leave the works to the almost absent mercies of the ayacutdars. It should also be pointed out that before the advent of a policy of maintenance even such work as the Government now undertake like raising the bunds to a safe standard formed part of the work done by the ryots.

Even to day this is so in Mysore State. The separation of certain items of work into ryots' work has not been done by reference to the historical fact of these items alone having formed part of the ryots share from time immemorial. It is easy to see that it was because the Tank Restoration Scheme Party laid emphasis on maintaining the bunds and sluices at certain specified standards of efficiency that the work is being done on those lines. It so happened that silt clearance called for no technical standards nor any technical skill. As for custom, it would appear that before the advent of a policy of maintenance, the tanks had more or less to be looked after by the ryots. Kudimaramath is thus an accident. In view of these circumstances, the only way to protect the tanks is to levy a cess and carry out silt clearance. The bait to village self-reliance can be always provided for by the issue of a notice to the concerned ryots before undertaking the work, but the work itself should necessarily form part of the general upkeep. This will allow ryots who are willing to do the work to escape the cess, and at the same time will not allow the tanks to deteriorate. The main remedies with regard to supply channels are thus (1) the inclusion of repairs to them as part of the work of general maintenance, (2) the provision for the levy of a portion of the charge of the cost and not as at present, the full charge plus a penalty, if the work is not done by the ryots, (3) the inclusion of this work in the circle system proposed to be adopted for tank repairs, (4) a strict interpretation of the expression "silted up" so that accumulation is avoided. These remedies are a half way house between total abolition of ryots' initiative and complete Government control and action and will while trying to keep up village self-reliance where it exists, not blindly expect it where it is absent to the detriment of a tank.

17. Even with the existing rules the officers in charge can adopt certain measures to keep the channels in good condition (1) Complaints have been frequently made by ryots that kudimaramath notices are being issued at a time when they are busy with sowing and transplanting. The necessity for the issue of notices is felt at jamabandi and by the time they are issued it is July or August. This is undoubtedly the wrong time. During azmoish, Revenue Inspectors should be asked to report on the condition of supply channels. The Divisional Officer should maintain a periodical in which these remarks are entered and notices issued to the ryots by December or January, so that they may do the work after harvest is over. All such works should be included in the Minor Irrigation Programme for the year and should be eliminated if the work is already done. By jamabandi the Divisional Officer should be in a position to eliminate the work or include the work in the Minor Irrigation Programme. The ryot should not be called away from his legitimate avocation and the method mentioned above takes this into consideration. (2) It has been found from experience that in many divisions the provisions in the Compulsory Labour Act insisting on the penalty amounts being spent in the village from which they were collected either on the same work for the repairs of which they were collected or on some other work, has not been properly given effect to. The result has been that such amounts have unnecessarily lapsed to Government. It is necessary that a separate register should be maintained to show the amount of such penalties available for each village. They should be adjusted towards kudimaramath work or other works in the village. The present kudimaramath register is inadequate. (3) A great deal of the silt that is carried by the channels can be arrested at the entrance of the channel into the tank by digging a pit in the bed of the supply

channel, over which the water should be made to flow. This will collect the silt into the pit. Another pit should be dug nearby and the sand in the first pit should as soon as the first pit gets filled, be thrown into the second. Otherwise by heaping the sand nearby, it again gets washed into the tank. The village community, Local fund contractors and others should be given free use of this sand. This experiment has been tried with considerable success in certain tanks in Krishnagiri taluk. It can be worked at first in the smaller tanks where the quantity of silt is likely to be inconsiderable and also in tanks where experience has shown that fillings are not in one big instalment but in several small ones ; for in the former case in a few hours the pit is likely to get filled up. It will be easy to utilize the services of the village establishment for this purpose. Figure 4 illustrates this

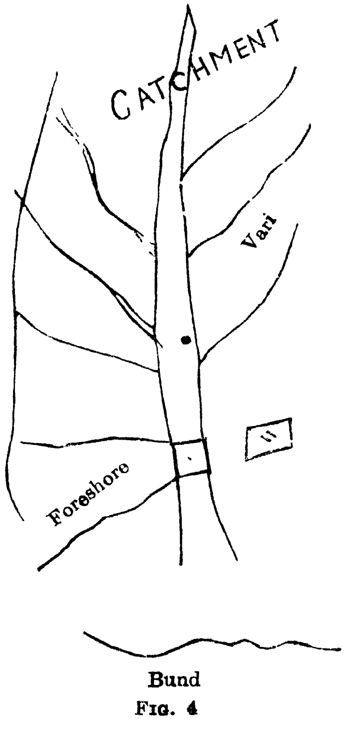
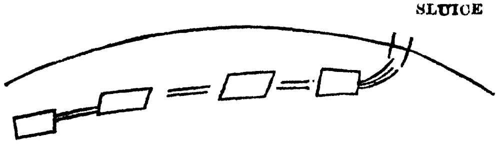


FIG. 4

18. The removal of the silt that has already accumulated in beds of tanks is an impossible task. If further silting up is prevented, it will be a matter for satisfaction. Certain remedies followed with success are detailed below :—(1) The rules for permission to quarry earth from tank beds should be interpreted in a very liberal way. At present such applications have to be scrutinized and orders passed and very often ryots are penalized for either (*a*) taking more than the quantity applied for, (*b*) for non-domestic and non-agricultural purposes, (*c*) for taking it before the issue of orders. The earth in the tank bed is a definite encumbrance to irrigation, its existence there is useful to no one and its removal is an undisguised blessing. In such circumstances the purpose of either insisting on applications or for making a distinction between agricultural and non-agricultural uses and domoestic and non-domestic, in fact, between anyone use and another, is not apparent. On the other

hand the policy should be to encourage the ryots to remove earth from tank beds. The general prohibition of not taking the earth from too near the bund alone need be insisted on. It is needless to say that the ryots should on no account be allowed to dig below the level of the sluice. (2) In preparing the tank bunds, earth is at present being taken from pits dug in the bed. No system is followed in digging them, but they are dug here and there in haphazard way. If they are dug as far as possible starting from near the sluice and proceeding in a parallel line to the bund and are also of uniform size and depth, then there will be a uniform lowering of the bed level at that part of the bed where most of the water finds its way. The pits should before the work in the bund is finished, be connected together. They will present a chain like appearance, somewhat like this :—



This experiment has been tried with success in Krishnagiri and Hosur taluks. (3) Since all the water finds its way or has to find its way to the sluice, silting up is greatest near the sluice. It is difficult to prevent this when water is full in the tank, but when a leading channel has to be dug to take water to the sluice it should always be made to take a curve on nearing the sluice, so that the silt may be concentrated at the curve. The channels in the Tanjore delta are usually made to take a zig-zag course and it was explained to the writer by an aged ryot that the purpose of such zig-zagginess was to catch the silt in the pockets, where the channel curves. (4) The rush of silt into the sluice is usually prevented by a masonry silt wall in front of the sluice. A better method of achieving the same result will be to use planks for the shutters in two or three sections, one or more planks to be used depending on the amount of water in the tank. A masonry wall in front of the sluice is of no use when water is very low or very high in relation to the wall, but only when the water is of a certain height. Removable planks such as are used in the Tanjore delta, serve the purpose more effectively. This has been tried in one tank in Krishnagiri taluk with success.

19. The position of the sluices in many tanks leaves a great deal to be desired. As noticed in paragraph 11, there is water in many tanks without reaching the sluice. In such cases the practice followed by the ryots is to dig a leading channel to the sluice. It is also not unusual to put up a wide circular bund in front of the sluice and bale the water into this artificial tank. The height of the sluice is, of course, conditioned by the height of the highest land in the ayacut. But, as has been noticed, very few tanks are able to command the original ayacut. It is within the experience of local officers, that a tank registered as class II is in fact only a class III or IV source. The reducing of the ayacuts of such tanks is a wide problem involving loss of revenue ; but a step should be made in this direction at least in the case of tanks in respect of which there has been continuous remission over a series of years. The elimination of such lands from the ayacut involves no loss of revenue to

Government but diminishes the correspondence and inspections involved in granting remissions and further helps to g ve a tru.r account of the tank and its ayacut capacity. This involves the creation of a temporary special staff and the financial aspects thereof will have to be worked out. In the second place, the question of having a high-level and a low-level sluice may be considered with reference to the position of such sluices in relation to the possible extent that its height will enable it to command on the one side, and on the other, the amount of remission saved by that extent of the ayacut at least being brought under cultivation. It is to be noted that this problem of having two sluices arises mainly with respect to the larger tanks. As already noticed, in the smaller tanks, the sluice needs shifting only to a higher level. Where this is not possible silt shutters should anyhow be provided. There are various other points to consider such as the need for refusing all transfers of land from dry to wet and the encouragement of transfers from wet to dry. This process is in the right direction. The mere fact that a person has been paying penal water rate for a number of years should not entitle him to a transfer of the concerned field to wet. Further, in repairing bunds, the question of sluice leakage should always receive attention. With a leaking sluice, the best of bunds is useless. The sluice should always be so modelled as to admit of inspection without breaking open the bund. A telescopic system of sluice modelling has much in its favour. Thirdly, the present, No. 20 account of the village in which rainfall is recorded is not of very great use. A proper tank register should be maintained. This should contain, in addition to the number of fillings that each tank gets and the number of times it surplusses, columns for inspecting officers to note their remarks. These remarks should be scrutinized at jamabandi and should form one of the methods of gathering information for preparing the Minor Irrigation Budget. It is interesting to note that in the neighbouring State of Mysore, such a register is being maintained.

Appendix No. 8

[Referred to in paragraph 125]

List of irrigation schemes sanctioned under the Grow More Food Campaign up to 31st March 1945

Dowlaishwaram Circle

1. Extension of irrigation under the Kalipatnam scheme, including Mutyalapalli Perupalem scheme.

2. Excavating the Kondapadu channel and its branches from junction canal above Muddapuram lock.

3. Providing irrigation facilities to Kalavapudi lands.

4. Peravaram pumping scheme.

5. Excavating a channel for the extension of irrigation under the tail end of Relangi channel.

6. Providing irrigation facilities to lands in Gumparru, etc., villages by remodelling the Kodamanchili channel and its branches.

7. Excavating a diversion channel on the right side of Rameswaram channel.

8. Excavating a new Penikeru channel.

9. Senapalli lanka scheme.

10. Excavating a channel from spout No. 15-R of Guthinadevi channel to irrigate Patha Injaram lands.

11. Providing irrigation facilities to 560 acres in Kaldhari village.

12. Extension of irrigation under pipe-sluice at M. 19—5—468 feet, right bank of Bank canal—New Vadapalam scheme.

13. Extension of Sakinetipalli weir channel and extending Vasista left flood bank.

14. Providing irrigation facilities to S. No. 255 of Kalipatnam.

15. Avidi scheme.

16. Extension of irrigation facilities to certain lands included in the Polavaram island project and extending the Polavaram main channel to irrigate Guthinadevi and Vemavaram villages.

17. Providing irrigation facilities to certain dry lands in Yeditha village.

18. Komarajulanka scheme.

19. Extension of irrigation under Nimmakayala Kothapalli channel.

20. Providing irrigation and drainage facilities to lands in Kanur and other villages.

21. Mahadevapuram tank project.

22. Dendulur pumping scheme.

23. Extension of Vadlur-Tetali channel.

24. Extending irrigation under Sesharayudu codu channel.

Madras Circle

25. Constructing an anicut across the Pillaperu and excavating a channel to improve supply to Mopad main channel.

26. Forming a new tank in Mogalicherla village.
27. Constructing a bed regulator across the Pambaleru river.
28. Ponvilantha Kalathur scheme.

Bezwada Circle

29. Improvements to the Enikepadu aqueduct.
30. Improvements to Bapatla East Swamp Drain, etc.

Anantapur Circle

31. Formation of a new tank in Motor Chintalapalli village.
32. Construction of a dam across the Kutalavanka at Gazulapalli.
33. Constructing a reservoir across the Gargeyapuram vagu.
34. Constructing a reservoir at Chinna-Tekkur.
35. Constructing a reservoir across the Paleru at Owk.
36. Chagalamarri project.
37. Restoration of the Beerappa cheruvu.
38. Excavating a channel from the right bank of the Pennar to irrigate lands in Gangavaram and Vibrampuram villages.
39. Diverting supplies from Jyothivagu into the Gangañapalli tank.
40. Vogur-Vakkamada project.
41. Restoration of the Rayapuram tank.
42. Excavating a supply channel to the Gottur Malli Devarayacheruvu.
43. Restoration of the Titakal tank.
44. Restoration of the Mallapanakeri tank.
45. Restoration of the Peddadasaripalli tank.

Trichinopoly Circle

46. Restoration of the Kovathattai tank.
47. Restoration of the Ponneri tank.
48. Formation of a tank across the Upper odai, Omandur village.

Coimbatore Circle

49. Uduthorahalla project (anicut scheme).
50. Restoration of the Nilambur tank.
51. Improvements to Badathalav tank.

Tanjore Circle

52. Providing direct source of supply to Konakodugalar drainage irrigation from the Cauvery.
53. Drainage improvements to Angudy and Pasar lands.
54. Constructing a notch across Cauvery Agaram channel in Vanagiri limits.
55. Providing direct source of irrigation from Cauvery to Padugai lands between the Cauvery and Kodamuruty.

56. Excavating a channel for irrigating lands in Vanarangudi and Sathanur villages.

57. Excavating a right side channel from Vadakkanandal anicut across the Gomukhi river.

58. Excavating Maruthangudi channel from Palavar.

59. Providing irrigation facilities to lands in Arantangi taluk by extending Cauvery-Mettur Project irrigation.

60. Providing irrigation facilities to Vallam Perambur and Nagathi villages from Pillai Voikal No. 3.

61. Providing irrigation facilities to certain lands in Rajendram and Narasanaykapuram villages.

62. Shifting the head of the Koiladi Thirappu channel.

63. Providing direct source of supply from the Cauvery to Pillai Voikal No. 2.

64. Providing irrigation facilities to lands in Agara Elathur village.

65. Constructing a surplus dam at Kona-Kattu Odappu in Poovambur channel.

66. Improvements to Karangalar drain.

67. Extension of irrigation under Cauvery Kondanar channel.

68. Excavating a straight cut from the existing flap outlet across the Adappampallam drain to the Cauvery.

69. Restoring the distributary and piping open off takes for improving irrigation in Nemmeli village.

70. Providing irrigation facilities to a dry block of 82 acres in Kurungudi village from Vadavar.

71. Providing irrigation and drainage facilities to lands in Kambayanatham village.

72. Constructing a sluice at mile 3/7 of North Bank canal and improving the M. Puthur channel course in rear.

Appendix No. 9

[Referred to in paragraph 130]

Statement showing the water-rates per acre which were in force under certain productive and unproductive works in the Madras Presidency during the year ending 30th June 1944.

Description of crop. (1)	Godavari and Kistna anicuts. (2)	Muniyeru project. (3)	Periyar system.* (4)	Bhavanasi tank. (5)	Venkatapuram tank. (6)	Mopad reservoir. (7)	Willingdon reservoir. (8)	Kanniyampalayam anicut.‡ (9)	Panjapatti reservoir.† (10)	Siddapur tank. (11)	Other systems (in tracts where the differential water rate system does not prevail).§ (12)
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	
1 Single wet crop	6 4	6 4	5 0	9 6	4 3	7 13	6 4	..	6 4	6 4	..
2 Second wet crop	3 2	3 2	3 0	4 11	2 1	3 15	3 2	..	3 2	3 0	..
3 Second wet crop (if compounded for two crops for a term of not less than five years).	10 3	..	..	..	..	..	..	..	..	..	..
4 Second dry crop on irrigated land except where the landholder has compounded under clause 3.	3 2	3 2	..	..	..	..	..	..	..	..	..
5 For sugarcane, betel and other garden produce remaining on the ground for the time of two crops.	9 6	9 6	8 0	14 1	6 4	11 12	9 6	..	..	9 0	..
6 For sugar cane, betel and other garden produce remaining on the ground for the time of two crops, if compounded for a term of not less than five years.	10 3	..	..	..	..	..	..	..	..	..	..
7 For a dry crop, whether first or second, grown on land for which irrigation has never been supplied or having been once supplied has been since discontinued.	3 2	..	..	4 11	2 1	3 15	..	..	..	..	..

Statement showing the water-rates per acre which were in force under certain productive and unproductive works in the Madras Presidency during the year ending 30th June 1944—cont.

Description of crop. (1)	Godavari and Kistna anicut. (2)	Muniyeru project. (3)	Periyar system. * (4)	Bhavanasi tank. (5)	Venkatapuram tank. (6)	Mopad reservoir. (7)	Willingdon reservoir. (8)	Kanniyampalaiyam anicut. ‡ (9)	Panjapatti reservoir. † (10)	Siddapur tank. (11)	Other systems (in tracts where the differential water rate system does not prevail). § (12)
	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	RS. A.	
8 For a third irrigated crop (wet) ..	2 8	3 2	2 9	..	..	..	..	..	..	..	..
9 For a third irrigated crop (dry) ..	1 4	3 2	1 0	..	..	..	..	..	..	..	..
10 Dry crop systematically irrigated ..	6 4	4 11	..	..	..	..	..	..	..	..	..
11 Second wet crop in the case of zamindari and inam lands.	6 4	3 2	..	..	..	..	..	..	..	..	..
12 Second wet crop in the case of zamindari and inam lands where the cultivator has compounded for two crops for a term of not less than five years.	10 3	..	..	..	..	..	..	..	..	..	..
13 For sugarcane, betel and other garden produce in zamindari and inam lands remaining on the ground for the time of two crops.	12 8	9 6	..	..	..	..	..	..	..	..	..
14 For sugarcane, betel and other garden produce in zamindari and inam lands remaining on the ground for the time of two crops, if the cultivator has compounded for a term of not less than five years.	10 3	..	..	..	..	..	..	..	..	..	..
15 For a first dry crop systematically irrigated.	..	..	5 0	..	..	..	..	..	..	..	..
16 For a second dry crop systematically irrigated.	..	..	3 0	..	..	..	..	..	..	..	..
17 For a first or second crop occasionally irrigated.	..	..	2 8	..	..	..	..	..	..	..	..

18 Special crops like onions, sweet potatoes, chillies, tobacco (the same as for a dry crop systematically irrigated).	..	..	5 0	..	..	..	..	..	..	..	..
19 Mango topes, coconut topes and other tope plantations—											
(a) If they take water for term of two wet crops.	..	..	8 0	..	..	..	..	..	..	..	..
(b) In other cases	..	..	5 0	..	..	..	..	..	..	..	..

Note.—When the water used for irrigation cannot be obtained without raising it by baling or by some mechanical contrivance a deduction of one-fourth of the water rate will be made.

* Double the rates are levied when Periyar water is supplied to Government and minor inam dry lands to the Cumbum Valley, Periyakulam taluk, to which extension of irrigation has been sanctioned.

† No charge for water for twenty years under G.Os. No. 128 I., dated 17th March 1916 and No. 30 I., dated 2nd February 1924.

‡ Standard scale of water cess has been ordered to be adopted until further orders—*Vide* G.O. Ms. No. 1277, Revenue, dated 29th June 1934.

§ First crop on dry land.	Second crop on dry land.	Charge for First crop.			Charge for Second crop.			Total charge.		
		RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
1 Wet	Wet	4	0	0	2	0	0	6	0	0
2 Dry	Dry, systematically irrigated	4	0	0	1	8	0	5	8	0
3 Dry	Dry, occasionally irrigated	4	0	0	1	0	0	5	0	0
4 Dry, systematically irrigated	Wet	3	0	0	2	8	0	5	8	0
5 Do.	Dry, systematically irrigated	3	0	0	2	0	0	5	0	0
6 Do.	Dry, occasionally irrigated	3	0	0	1	8	0	4	8	0
7 Dry, occasionally irrigated	Wet	2	0	0	3	0	0	5	0	0
8 Do.	Dry, systematically irrigated	2	0	0	2	8	0	4	8	0
9 Do.	Dry, occasionally irrigated	2	0	0	2	0	0	4	0	0

Water-rates in Tanjore district under the Tanjore District Cauvery Water-cess Rules.

	For first crop.			For second crop.			For dufasal crop.			For third crop.		
Under the Grand Anicut canal system or through Vadavar system for regular irrigation of crops.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
1 On dry lands in ryotwari or proprietary villages including minor inams.	15	0	0	7	8	0	22	8	0	3	12	0
2 In manavari lands	14	0	0	7	0	0	21	0	0	3	8	0
3 On lands in proprietary villages recorded as wet.	10	0	0	7	8	0	17	8	0	3	12	0
Water supply otherwise than through the Grand Anicut Canal system or Vadavar system.												
1 On dry lands in ryotwari or proprietary villages including minor inams.	10	0	0	7	8	0	17	8	0	3	12	0
2 In manavari lands	9	0	0	7	0	0	16	0	0	3	8	0
3 On lands in proprietary villages recorded as wet.	7	8	0	7	8	0	15	0	0	3	12	0

Appendix No. 10

[Referred to i ι paragraph 144]

Statement showing details of famines in the Madras Province during the last forty years

Year of famine.	District.	Taluk.	Affected area in square miles.	Population according to Collector's report.	Population of the area in 1941 calculated with reference to the rate of increase according to each. census.	Workers.	Dependants of workers.	Gratuitously relieved in villages.	Total.	Total cost of famine operations.
	Areas affected by famine and the population of the areas.					Total number of units relieved.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
										RS.
1905 ..	Chingleput	Tiruvallur	745·00	253,973	394,329	7,126	..	61,030	68,156	23,491
		Ponneri	347·00	136,597	146,656					
1919 ..	Kistna	Nandigama (zamindari) Munagala Paragana.	108·04	23,760	30,559	143,455	..	45,739	189,194	28,411
1921–22 ..	Bellary	Adoni (part)	300·00	80,000	95,272	3,119,975	698,899	149,564	3,968,438	5,72,211
		Alur	576·00	90,007	102,645					
		Bellary (part)	439·00	63,155	83,377					
		Siruguppa	458·00	66,529	82,782					
	Anantapur	Gooty	898·00	134,355	178,129	2,027,773	682,209	568,421	3,278,403	4,74,238
	Kurnool	Kurnool (part)	250·00	61,352	78,195	331,390	16,702	142,961	491,053	59,846
1924 ..	Bellary	Bellary (part)	417·00	88,654	117,040	294,119	74,618	..	368,737	51,073
	Anantapur	Gooty	898·00	134,355	178,129	687,958	167,898	190,382	1,046,238	1,70,472
		Madakasira	443·00	85,595	107,160					
		Penukonda (part)	500·00	76,359	85,555					
		Hindupur (part)	89·00	18,556	23,593					
		Dharmavaram (part)	184·00	31,676	35,463					
1926 ..	Coimbatore	Dharapuram	Details not available.							*414
1931–32 ..	Bellary	Bellary	651·63	132,015	174,284	994,836	..	105,823	1,100,659	1,38,911
		Alur	274·03	47,380	54,037					
1934–35 ..	Bellary	Bellary	296·00	40,892	46,862	3,474,984	1,409,706	803,704	5,688,394	5,79,246
		Siruguppa	213·00	29,783	33,416					
		Alur	227·00	40,471	42,778					
		Rayadrug	101·00	12,021	13,884					

Statement showing details of famines in the Madras Province during the last forty years—cont.

Year of famine.	District.	Taluk.	Affected area in square miles.	Population according to Collector's report.	Population of the area in 1941 calculated with reference to the rate of increase according to each census.	Workers.	Dependants of workers.	Gratuitously relieved in villages.	Total.	Total cost of famine operations.
	Areas affected by famine and the population of the areas.					Total number of units relieved.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
										RS.
1934–35 ..	Anantapur ..	.. Gooty	605·00	100,192	111,814	8,582,171	3,157,427	3,158,197	14,897,795	11,44,206
		Tadpatri	46·00	20,355	22,146					
		Anantapur	210·00	27,188	31,728					
		Dharmavaram	160·00	21,623	23,850					
		Penukonda	682·00	98,498	104,112					
		Hindupur	431·00	110,194	127,715					
1937–38 ..	Bellary ..	.. Alur	613·55	105,400	111,408	10,067,643	2,880,496	3,952,599	16,900,738	14,16,600
		Bellary	705·00	132,100	151,387					
		Adoni	154·40	26,700	27,795					
		Siruguppa	403·00	62,400	70,013					
		Rayadrug	102·00	12,756	14,733					
	Anantapur ..	.. Gooty	895·91	159,640	178,158	3,612,508	2,040,138	2,352,474	8,005,120	5,46,391
		Tadpatri	76·60	17,700	19,258					
		Penukonda	678·24	98,498	104,112					
		Hindupur	46·00	12,551	14,547					
	Kurnool ..	.. Pattikonda	519·00	81,448	84,381	1,807,265	397,796	107,038	2,312,099	2,29,864
		Kurnool	218·00	52,830	60,226					
1938 Weavers relief.	Bellary ..	.. Yemmiganur and Nagaladinne centres, Adoni taluk.	..	..	..	147,392	..	..	147,392	35,631
	Anantapur ..	.. Uravakonda	..	..	..	118,359	60,369	..	178,728	35,813
1939 ..	Coimbatore ..	.. Dharapuram	842·00	261,980	282,152	15,185,838	2,128,205	2,972,081	20,286,124	17,49,377
		Palladam	204·00	77,212	88,712					
		Udamalpet	100·00	48,790	51,864					
	Chingleput ..	.. Ponneri	637·49	267,658	246,280	38,443	..	..	38,443	*10,350
		Tiruvallur	523·14	222,478	282,893					
		Sriperumbudur	305·87	179,564	194,348					
		Chingleput	435·87	204,974	221,218					
		Madurantakam	530·11	250,828	265,540					

1942–43 ..	Bellary	Bellary	705·00	139,000	139,000	46,488,835	9,481,024	1,920,379	57,890,238	1,40,08,588
		Siruguppa	458·00	70,000	70,000					
		Alur	613·55	111,445	111,445					
		Adoni	640·00	130,000	130,000					
		Rayadrug	255·00	36,488	36,488					
	Anantapur	Gooty	895·92	178,189	178,189	16,037,962	4,183,578	4,952,265	25,173,805	57,98,350
		Tadpatri	480·86	53,148	53,148					
		Anantapur	231·42	54,108	54,108					
		Dharmavaram	735·94	87,173	87,173					
		Kalyandrug	96·54	20,249	20,249					
		Penukonda	454·92	72,050	72,050					
		Madakasira	111·25	54,367	54,367					
	Kurnool	Pattikonda	211·64	35,242	35,242	5,667,963	992,679	265,141	6,925,783	18,77,494
Weavers' relief in 1942–43	Bellary	Adoni 5, Rayadrug 1	..	..	..	.. *	..	..	..	1,82,000

* Test works only.

APPENDIX No. 11

[Referred to in paragraphs 214 and 215]

Percentage of general population depending on several varieties of cereals

District.	Rice.	Percentage of population depending on							
		Millets.							Total millets.
		Cholam.	Cumbu.	Ragi.	Korra.	Varagu.	Samai.	Maize.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 Ganjam ..	89	..	..	11	..	..	..	..	11
2 Vizagapatam ..	91	1	3	5	..	..	..	..	9
3 East Godavari.	100	..	..	..	..	..	..	..	..
4 West Godavari.	90	9	..	1	..	..	..	..	10
5 Kistna ..	75	21	2	1	1 (other grains).	..	..	..	25
6 Guntur ..	57	23	9	11	..	..	..	..	43
7 Kurnool ..	35	25	10	5	15	10 (arika).	..	..	65
8 Bellary ..	65	21	2	1	11	..	..	..	35
9 Anantapur ..	54	7	1	9	5	24 (others).	..	..	46
10 Cuddapah ..	25	21	17	35	2 (others).	..	..	..	75
11 Nellore ..	50	20	15	10	5 (others).	..	..	..	50
12 Chingleput ..	80	..	..	20	..	..	..	..	20
13 South Arcot ..	70	..	10	20	..	..	..	..	30
14 Chittoor ..	52	3	8	33	..	..	3	1	48
15 North Arcot ..	67	7	6	18	2	..	..	..	33
16 Salem	65	3	4	26	2	..	..	..	35
17 Coimbatore ..	58	11	11	20	..	..	..	..	42
18 Trichinopoly ..	62	8	15	11	..	3	1	..	38
19 Tanjore ..	96	2	1	1	..	..	..	..	4
20 Ramnad ..	65	4	7	15	..	9	..	..	35
21 Madura ..	66	13	8	12	1	..	..	..	34
22 Tinnevelly ..	94	1	3	2	..	..	..	..	6
23 Malabar .. / 24 South Kanara	No information.								
25 The Nilgiris ..	97	..	..	2	..	1	..	..	3

Appendix No. 12

[Referred to in paragraphs 228 and 229]

Areas sown with main food and non-food crops, area sown more than once, and net area cropped from 1920–21 to 1944–45

Year.	Area under food crops (000 acres).				Area under non-food crops (000 acres).				Total area sown (food and non-food crops).	Area sown more than once.	Net area cropped.
	Rice.	Millets.	Pulses.	Total under food crops.	Oilseeds.	Fibres.	Drugs.	Total under non-food crops.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
									ACS.	ACS.	ACS.
1920–21	11,096	14,230	..	29,132	3,490	2,277	453	..	..	..	33,073
1921–22	11,280	14,753	2,787	31,128	3,373	1,942	460	6,405	37,533	4,521	33,012
1922–23	11,286	14,003	2,988	30,631	3,552	2,485	448	7,132	37,763	4,766	32,997
1923–24	10,517	13,360	2,688	28,952	3,585	2,085	455	7,472	36,424	4,131	32,293
1924–25	10,870	14,699	2,801	29,954	3,743	3,069	504	7,969	37,923	4,585	33,338
1925–26	11,323	14,237	2,879	30,034	4,495	3,132	496	8,754	38,788	4,954	33,834
1926–27	10,842	14,208	2,701	29,354	4,468	2,389	476	8,013	37,367	4,104	33,263
1927–28	10,930	14,701	2,656	29,861	5,260	2,273	536	8,697	38,558	4,765	33,793
1928–29	11,019	14,119	2,827	29,516	5,516	2,641	508	9,263	38,779	4,711	34,068
1929–30	11,262	14,384	3,304	30,459	4,988	2,640	510	8,800	39,259	4,887	34,372
1930–31	11,678	13,989	3,218	30,470	5,332	2,210	505	8,723	39,193	4,969	34,224
1931–32	11,538	13,952	3,140	30,375	4,426	2,354	545	7,969	38,344	4,848	33,496
1932–33	11,534	13,953	3,211	30.386	5,423	2 129	539	8,778	39,164	4,978	34,186
1933–34	11,704	13,292	3,052	29,754	5,648	2,327	535	9,176	38,930	5,050	33,880
1934–35	11,056	13,802	3,006	29,761	4,053	2,435	585	7,777	37,538	4.737	32,801
1935–36	10,478	13,349	2,936	28,396	4,191	2,846	569	8,232	36,628	4,789	31,839
1936–37	9,890	13,049	2,984	24,476	5,222	2,646	540	8,394	32,870	1,164	31,706
1937–38	10,141	12,163	2,796	26,623	6,353	2,781	577	10,295	36,918	4,886	32,032
1938–39	9,844	13,166	2,426	27,039	5,568	2,158	603	8,922	35,961	4,578	31,383
1939–40	9,884	13,126	2,692	27,365	5,288	2,420	592	8,916	36,281	4,821	31,460
1940–41	10,744	12,599	2,807	27,826	5,634	2,615	606	9,517	37,343	5,384	31,959
1941–42	10,212	13,296	2,915	28,046	4,380	2,795	630	8,373	36,419	4,806	31,613
1942–43	10,382	13,095	2,900	28,007	5,138	2,459	576	8,733	36,740	5,416	31,324
1943–44	10,925	13,204	3,109	28,928	5,215	2,417	525	8,777	37,705	5,814	31,891
1944–45	11,014	12,291	3,006	27,968	5,906	1.879	617	9,031	36,999	5,465	31,534

APPENDIX No. 13

[Referred to in paragraph 214]

Normal area under food and non-food crops, 1944–45

District.	Total area sown.	Area under food crops.	Percentage.	Area under non-food crops.	Percentage.
(1)	(2)	(3)	(4)	(5)	(6)
	ACS.	ACS.		ACS.	
Vizagapatam ..	2,241,760	1 793,680	80·0	448,080	20·0
East Godavari ..	1,386,190	1,167,220	84·2	218,970	15·8
West Godavari ..	987,100	862,060	87·3	125,040	12·7
Kistna	1,249,070	961,470	77·0	287,600	23·0
Guntur	2,413,490	1,602,290	66·4	811,200	33·6
Kurnool	2,123,550	1,415,980	66·7	707,570	33·3
Bellary	2,529,920	1,564,230	61·8	965,690	38·2
Anantapur ..	2,062,890	1,447,920	70·2	614,970	29·8
Cuddapah	1,150,500	863,010	75·0	287,490	25·0
Nellore	1,476,920	1,332,790	90·2	144,130	9·8
Chingleput ..	983,920	867,730	88·2	116,190	11·8
South Arcot ..	1,582,300	1,090,130	68·9	492,170	31·1
Chittoor	913,740	728,950	79·8	184,790	20·2
North Arcot ..	1,471,170	1,036,420	70·4	434,750	29·6
Salem	1,944,210	1,560,910	80·3	383,300	19·7
Coimbatore ..	2,286,430	1,563,590	68·4	722,840	31·6
Trichinopoly ..	1,513,340	1,243,810	82·2	269,530	17·8
Tanjore	1,522,220	1,396,810	91·8	125,410	8·2
Madura	1,445,290	1,054,130	72·9	391,160	27·1
Ramnad	1,321,900	953,610	72·1	368,290	27·9
Tinnevelly ..	1,426,620	940,580	65·9	486,040	34·1
Malabar	1,808,890	1,285,800	71·1	523,090	28·9
South Kanara ..	765,490	691,190	90·3	74,300	9·7
The Nilgiris ..	102,710	37,940	36·9	64,770	63·1
Province ..	36,709,620	27,462,250	74·8	9,247,370	25·2

APPENDIX No. 14

[Referred to in paragraph 222]

Estimated production of rice (paddy 000 tons), 1924–25 to 1944–45

District. (1)	1924–25. (2)	1925–26. (3)	1926–27. (4)	1927–28. (5)	1928–29. (6)	1929–30. (7)	1930–31. (8)	1931–32. (9)	1932–33. (10)	1933–34. (11)	1934–35. (12)
Ganjam	566	607	535	637	576	517	609	445	483	554	575
Vizagapatam ..	598	700	550	654	674	575	642	650	624	657	678
East Godavari ..	477	519	525	523	516	466	444	553	547	486	564
West Godavari ..	551	571	584	614	570	559	529	546	543	513	550
Kistna	454	443	453	471	492	467	442	469	463	438	457
Guntur	322	319	303	309	330	323	297	315	330	307	317
Kurnool	36	44	35	49	44	31	40	50	38	52	45
Bellary	20	20	17	19	21	11	21	20	27	29	19
Anantapur	58	49	60	68	55	87	97	44	78	100	20
Cuddapah	80	98	71	68	73	82	104	86	56	76	49
Nellore	292	330	203	267	258	139	304	275	231	279	219
Chingleput	425	514	350	372	446	461	490	503	493	401	416
South Arcot	386	413	334	368	446	454	432	447	462	381	391
Chittoor	141	146	128	138	142	151	261	218	153	156	129
North Arcot	277	348	261	283	349	327	419	465	412	328	311
Salem	90	67	67	81	73	93	142	118	157	169	122
Coimbatore	85	79	80	84	77	85	96	84	96	97	74
Trichinopoly	161	175	175	188	196	215	218	222	251	251	214
Tanjore	629	767	770	743	762	820	574	710	777	744	811
Madura	254	269	252	249	262	283	310	297	320	332	252
Ramnad	267	268	143	192	209	290	327	307	345	365	190
Tinnevelly	290	295	261	293	279	326	294	284	268	306	196
Malabar	490	527	525	523	523	548	539	526	522	524	454
South Kanara ..	374	373	384	389	382	387	319	398	390	385	378
The Nilgiris	5	4	4	4	4	4	4	4	2	4	4
Total paddy	7,326	7,943	7,078	7,586	7,757	7,700	8,023	8,037	8,068	7,932	7,434
Converted into rice 000 tons 67 per cent ..	4,908	5,322	4,742	5,082	5,197	5,159	5,375	5,385	5,406	5,314	4,981

Estimated production of rice (paddy 000 tons), 1924–25 to 1944–45—cont.

District.	1935–36. (13)	1936–37. (14)	1937–38. (15)	1938–39. (16)	1939–40. (17)	1940–41. (18)	1941–42. (19)	1942–43. (20)	1943–44. (21)	1944–45. (22)
Ganjam	208	..	..	..	..	..	..	..	..	..
Vizagapatam ..	376	549	412	404	399	478	339	378	287	375
East Godavari ..	548	577	552	557	489	561	519	525	528	535
West Godavari ..	545	552	554	473	468	542	514	602	584	574
Kistna	448	442	444	329	384	479	451	452	448	452
Guntur	307	368	324	314	326	345	333	295	315	334
Kurnool	49	44	48	52	51	63	38	37	44	57
Bellary	21	24	17	24	25	25	21	16	21	22
Anantapur	93	69	61	127	81	108	88	42	58	80
Cuddapah	93	69	80	87	84	105	87	71	113	100
Nellore	254	242	269	184	254	312	284	237	290	312
Chingleput	438	367	478	174	323	441	457	264	389	401
South Arcot	415	379	408	260	413	435	440	434	445	421
Chittoor	197	165	187	135	175	191	159	92	238	220
North Arcot	421	311	415	311	350	402	386	253	492	409
Salem	123	109	109	143	183	234	193	168	189	207
Coimbatore	70	79	76	69	72	89	93	93	88	105
Trichinopoly	228	226	260	224	264	285	280	268	279	273
Tanjore	830	858	869	845	843	875	947	949	944	917
Madura	247	290	288	232	246	308	306	282	277	341
Ramnad	262	251	268	129	170	256	243	247	176	317
Tinnevelly	244	314	249	223	204	301	305	290	267	275
Malabar	476	496	476	430	463	468	528	505	528	450
South Kanara ..	386	374	390	[illegible]	396	379	382	382	357	361
The Nilgiris	5	5	5	5	5	5	5	5	6	5
Total paddy	7,284	7,156	7,239	6,120	6,667	7,687	7,396	6,886	7,361	7,543
Converted into rice 000 tons 67 per cent ..	4,880	4,795	4,850	4,100	4,467	5,150	4,955	4,614	4,932	5,054

APPENDIX No. 15

[Referred to in paragraph 220]

Normal production of millets (husked), 1944–45

District. (1)	Cholam. (2)	Cumbu. (3)	Ragi. (4)	Korra. (5)	Varagu. (6)	Samai. (7)	Maize. (8)	Total. (9)
	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
Vizagapatam	17,510	41,360	83,430	2,760	1,224	2,679	2,100	151,063
East Godavari	26,605	10,480	6,741	880	474	1,155	936	47,271
West Godavari	13,685	1,800	1,476	120	186	77	306	17,650
Kistna	56,865	3,744	1,773	168	918	17	2,988	66,473
Guntur	92,480	35,000	7,956	13,120	1,746	33	7,980	158,915
Kurnool	121,210	14,320	13,230	53,120	11,160	83	66	213,189
Bellary	80,525	16,560	6,012	57,600	144	1,188	24	172,053
Anantapur	48,960	20,720	50,580	37,040	3,810	6,765	24	167,899
Cuddapah	73,270	30,560	39,960	14,800	3,900	363	24	162,877
Nellore	86,360	38,960	49,500	5,376	11,880	193	36	192,305
Chingleput	1,700	3,760	29,340	240	6,660	17	18	41,735
South Arcot	19,125	22,080	40,500	2,320	45,000	193	174	129,392
Chittoor	13,940	36,456	76,950	528	2,550	1,788	12	132,224
North Arcot	21,080	18,400	52,470	312	14,760	3,267	150	110,439
Salem	72,845	81,120	91,980	3,496	11,340	14,245	240	275,266
Coimbatore	132,175	57,040	73,800	4,904	852	6,545	60	275,376
Trichinopoly	59,330	51,520	22,140	168	38,160	2,525	492	174,335
Tanjore	..	1,832	5,067	16	8,400	17	2,022	17,354
Madura	80,070	9,840	26,910	1,856	11,460	12,100	762	142,998
Ramnad	15,895	22,160	34,830	40	18,300	1,529	60	92,814
Tinnevelly	30,430	30,080	14,580	64	1,758	4,081	24	81,017
Malabar	136	..	5,085	216	24	952	..	6,413
South Kanara	..	..	2,295	..	..	22	..	2,317
The Nilgiris	17	..	1,071	48	..	732	6	1,874
Total ..	1,074,213	548,392	737,766	199,192	195,306	60,566	18,504	2,833,939

Appendix No. 16

[Referred to in paragraph 216]

Population of Madras Presidency by Districts

(Estimated Population in 1944 and 1945.)

Total area of the Province, 126,166 square miles.
Number of towns, 407. Number of villages, 35,430.

Districts.	('000s) 1931.	('000s) 1941.	Density per sq. mile. 1941.	('000s) 1944 (probable.)	('000s) 1945 (probable.)
(1)	(2)	(3)	(4)	(5)	(6)
Vizagapatam—					
Agency	215	221	71	3,963	4,001
Plains	3,270	3,625	609		
East Godavari—					
Agency	241	272	74	2,241	2,177
Plains	1,680	1,890	743		
West Godavari	1,223	1,380	558	1,430	1,537
Kistna	1,254	1,444	416	1,506	1,528
Guntur	2,036	2,277	395	2,353	2,381
Nellore	1,486	1,670	203	1,661	1,673
Cuddapah	949	1,057	178	1,092	1,103
Kurnool	1,025	1,146	151	1,184	1,198
Bellary	970	1,061	184	1,076	1,086
Anantapur	1,050	1,171	174	1,210	1,224
Madras	647	777	26,810	822	837
Chingleput	1,665	1,824	590	1,874	1,897
Chittoor	1,447	1,632	277	1,691	1,713
North Arcot	2,267	2,578	555	2,680	2,713
Salem	2,434	2,869	406	3,009	3,065
Coimbatore	2,445	2,810	395	2,930	2,970
South Arcot	2,455	2,609	620	2,656	2,673
Tanjore	2,386	2,563	685	2,610	2,638
Trichinopoly	1,944	2,194	496	2,281	2,303
Madura	2,165	2,447	511	2,544	2,569
Ramnad	1,839	1,980	412	2,022	2,039
Tinnevelly	2,047	2,245	520	2,306	2,329
The Nilgiris	169	210	214	224	229
Malabar	3,534	3,929	671	4,048	4,100
South Kanara	1,372	1,524	379	1,570	1,589
Total ..	44,205	49,342*	..	50,990	51,569

* Urban—7,865— 16 per cent. Rural—41,477— 84 per cent.

States—

Pudukkottai	401	438	872	..
Banganapalli	39	45	174	..
Sandur	14	16	95	..

APPENDIX NO. 17

[Referred to in paragraph 220]

Details of imports and exports of jowar and bajra by sea and rail for the years 1938-39 to 1945-46

—	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.	1944-45.	1945-46.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
Imports by sea.								
Coastwise—								
From—								
Bombay	577	54	318	300	70	6	..	..
Sind	107	272	154	167	47	26,097	16,523	9,357
British ports within the Province.	107	37	112	..	126	1	65	..
Kathiawar	597	235	123	250	112	1,876	292	..
Foreign	1,388	598	707	717	355	27,980	16,880	9,357
From Burma	411	882	..	..	..	..	..	..
Total by sea ..	1,799	1,480	707	717	355	27,980	16,880	9,357

By rail.

(Figures in railway maunds) 27·2 maunds = 1 ton.

From—								
Orissa	2,225	1,504	1,557	3,502	13,368	4,481	Particulars are not available.	Particulars are not available.
Central Provinces ..	15	8	122	1,781	..	41,006		
Bombay	278,437	69,301	10,972	111,029	45,635	66,379		
Rajputana	1,682	5	7	5,444	..	16,347		
Bihar	3	5	..	..	..	..		
Nizam's Dominions ..	24,366	1,524	175,673	91,271	5,706	168,072		
Mysore	412,224	220,633	79,150	316,467	72,964	1,033		
Central India	529	140	..	337	..	..		
United Provinces ..	5,456	9	2,555	6,129	25,812	108,970		
Punjab	2,609	812	1,711	18,672	64,391	390,746		
Delhi	..	495	..	406	..	1,100		
Bombay Port	..	..	..	..	..	17,061		
Karachi	..	..	..	..	1,807	1,197		
Calcutta	..	..	..	..	..	..		
Total (in railway maunds).	727,546	294,436	271,747	555,038	229,682	817,392	Particulars are not available.	
Total in tons ..	26,748	10,825	9,991	20,391	8,438	30,029	..	..
Total imports by sea and rail in tons.	28,547	12,305	10,698	21,108	8,793	58,009	..	..

Details of imports and exports of jowar and bajra by sea and rail for the years 1938–39 *to* 1945–46—cont.

—	1938–39.	1939–40.	1940–41.	1941–42.	1942–43.	1943–44.	1944–45.	1945–46.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
			Exports by sea.					
Coastwise—								
To—								
British ports within the Province.	112	35	110	..	..	14	..	7
Bombay	..	25	97	132	..	..	..	99
Kathiawar	..	103	..	..	..	..	..	350
Travancore	..	..	..	..	..	322	1,093	..
Total ..	112	1[illegible]3	207	132	..	336	1,093	456
Foreign—								
Ceylon	1	1	3	21	2,725	..	..	..
Straits Settlements ..	..	..	2	..	..	..	..	..
Federated Malaya States.	1	..	1	1	..	..	..	..
Total by sea ..	114	164	213	154	2,725	336	1,093	456
							(In railway maunds.)	
			By rail.					
To—								
Bombay	950	18,387	61,648	12,[illegible]92	58,497	18	Particulars are not available.	Particulars are not available.
Rajputana	101	..	..	..	..	..		
Nizam's Dominions ..	23,938	327,350	4,020	8,641	188	8		
Mysore	2,021	5,214	2,987	[illegible] 2	1,521	92		
Orissa	132	21	1,005	69	1,050	3		
Bengal	2	..	21	..	..	..		
Delhi	..	..	79	40	..	..		
Central India	..	..	1	..	..	..		
United Provinces ..	..	..	225	4	..	..		
Calcutta	..	..	..	..	..	403		
Central Provinces ..	..	..	..	984	2,061	68		
Bombay Port	..	..	..	..	18,279	..		
Total (in railway maunds).	27,144	350,972	69,986	22,962	81,596	592	Particulars are not available.	
Total in tons ..	998	12,903	2,573	844	2,998	22	..	..
Total exports by sea and rail in tons.	1,112	13,067	2,786	998	5,723	358	..	..
Net imports	27,435	−762	7,912	20,110	3,070	57,651	..	..
Average net imports ..	19,236 tons.							

Appendix No. 18

[Referred to in paragraphs 215 and 229]

Production, consumption and net imports of important food grains

Year.	Rice. Production of rice in thousands of tons (000 being omitted).	Rice. Net imports of paddy and rice in tons of rice by rail and sea in the calendar year following.	Rice. Supply of rice available for consumption in the calendar year.	Wheat flour. Imports by sea and rail.	Wheat flour. Export of wheat flour by sea and rail.	Wheat flour. Net Imports of wheat flour by rail and sea.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		TONS.	TONS.	TONS.	TONS.	TONS.
1935-36	4,880	328,525	5,208,525	..	..	..
1936-37	4,794	318,567	5,112,569	43,827	1,436	42,391
1937-38	4,850	323,512	5,173,512	46,863	1,830	45,033
1938-39	4,100	582,623	4,682,623	49,334	4,023	45,311
1939-40	4,467	344,649	4,811,649	49,463	4,098	45,365
1940-41	5,125	365,566	5,490,313	55,129	4,111	51,018
1941-42	4,955	— 9,575	4,945,425	48,547	3,466	45,081
1942-43	4,575	— 244,910	4,330,090	31,926	2,461	29,465
1943-44	4,932	— 52,755	4,879,195	50,309	318	49,991
1944-45	5,054	Not available.		Not available.	Not available.	

Year.	Jowar and bajra. Production in thousands of tons (000 being omitted).	Jowar and bajra. Net imports by rail and sea in the next season.	Jowar and bajra. Supply of Jowar and Bajra available for consumption in the next year.	Chillies. Production.	Chillies. Imports by sea.	Chillies. Exports by sea.	Chillies. Net supplies.
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
		TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
1935-36	2,080	1,075	2,081,075	..	..	..	..
1936-37	2,011	14,648	2,025,648	147,500	915	3,245	145,170
1937-38	1,760	27,410	1,787,410	168,700	2,250	4,578	166,372
1938-39	1,909	—955	1,908,045	201,800	3,386	5,746	199,440
1939-40	2,090	7,472	2,097,472	197,000	907	5,545	192,862
1940-41	2,039	20,110	2,059,110	183,400	848	5,342	178,906
1941-42	1,854	3,070	1,857,070	174,722	640	6,419	168,943
1942-43	1,705	57,651	1,762,651	185,520	868	8,793	10,095
1943-44	1,789	Not available.		148,827	2,501	1,616	149,712
1944-45	1,807	Not available.		139,450	8,144	2,083	145,511

Production, consumption and net imports of important food grains—cont.

Year.	Pulses. Production of pulses unhusked.	Net imports by rail and by sea in the next season.	Supply of pulses available for consumption next year.	Sugar. Production.	Imports by rail and sea.	Exports by rail and sea.	Net supplies.
	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
1935–36	262,180	189,626	451,806	..	..	..	..
1936–37	250,850	288,399	539,249	21,100	77,607	9,666	89,041
1937–38	226,070	251,066	477,136	20,700	73,328	11,556	82,472
1938–39	206,710	238,694	445,404	23,000	78,196	9,972	91,224
1939–40	250,470	244,875	495,345	31,300	66,551	12,747	85,104
1940–41	277,230	93,891	371,121	39,800	44,023	11,415	72,408
1941–42	265,520	78,851	344,371	30,800	66,003	35,702	61,106
1942–43	215,000	9,891	224,891	327,240	38,612	23,341	342,511
1943–44	214,514	29,632	244,146	435,200	54,419	23,530	486,089
1944–45	270,040	Not available.		459,910	Not available.		

Year.	Wheat. Production in tons.	Net imports by rail and sea in the next season.	Supply of wheat available for consumption in the next year.	Coriander. Acreage.	Yield (350 lb. per acre) Tons (production.)
	(22)	(23)	(24)	(25)	(26)
		TONS.	TONS.	TONS.	TONS.
1935–36	2,000	19,133	21,133	126,747	19,804
1936–37	2,000	18,631	20,631	111,974	17,496
1937–38	2,000	20,331	22,331	100,465	15,698
1938–39	2,000	18,799	20,779	85,063	13,201
1939–40	2,000	20,055	22,055	130,966	20,463
1940–41	2,000	20,345	22,345	136,062	21,260
1941–42	2,000	21,894	23,894	114,286	17,858
1942–43	2,000	6,535	8,535	100,590	15,798
1943–44	2,000	16,739	18,739	96,615	15,096
1944–45	2,000	Not available.	Not available.	109,496	17,109

Appendix No. 19

[Referred to in paragraph 226]

Imports of paddy and rice for 1930–31 *to* 1945–46

Year.	Burma.	French Indo-China.	Siam.	Others.	Total.
(1)	(2)	(3)	(4)	(5)	(6)
Foreign imports of paddy into Madras Presidency including Cochin					
Quantity (000 tons) imported from					
1930–31	98·5	1·6	..	..	100·1
1931–32	106·3	9·0	..	..	115·3
1932–33	61·0	..	..	..	61·0
1933–34	75·5	1·3	3·1	..	79·9
1934–35	82·1	65·2	34·1	..	181·4
1935–36	89·8	91·1	18·6	..	199·5
1936–37	27·0	53·3	1·7	..	88·0
1937–38	28·3	2·8	..	..	31·1
1938–39	51·1	16·1	7·1	..	74·3
1939–40	29·6	145·2	43·3	..	308·1
1940–41	4·8	29·8	2·7	..	37·3
1941–42	0·4	..	..	..	0·4
1942–43	..	..	..	..	..
1943–44	..	..	..	..	..
1944–45	..	..	..	..	..
1945–46	..	..	..	..	..
Foreign imports of rice into the Madras Province					
Quantity (000 tons) imported from					
1930–31	331·5	3·5	0·1	0·4	335·5
1931–32	416·8	14·9	2·3	0·1	434·1
1932–33	377·1	20·6	14·5	0·1	412·3
1933–34	523·8	24·1	53·3	0·3	601·5
1934–35	659·8	26·6	242·1	0·7	929·2
1935–36	795·0	7·3	65·7	..	868·0
1936–37	680·4	1·8	8·6	..	690·8
1937–38	679·4	0·1	0·1	..	679·6
1938–39	683·2	0·5	0·3	..	684·0
1939–40	759·5	44·3	18·7	0·2	822·7
1940–41	491·5	16·1	0·7	1·0	509·3
1941–42	355·5	..	..	..	355·5
1942–43	16·9	..	..	..	16·9
1943–44	..	..	..	..	..
1944–45	..	..	..	..	..
1945–46	15·7	..	..	..	15·7

Year	Bombay.	Others.	Total.	Bombay.	Bengal.	Others.	Total.
	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Imports of paddy and rice by sea from other provinces in (000) tons							
	Paddy.	Paddy.	Paddy.	Rice.	Rice.	Rice.	Rice.
1930–31	11·3	..	11·3	2·7	1·3	..	4·0
1931–32	7·2	..	7·2	2·3	5·8	0·2	8·3
1932–33	7·9	0·5	8·4	9·2	42·6	6·4	58·2
1933–34	4·6	0·8	5·4	7·9	2·5	0·1	10·5
1934–35	4·6	..	4·6	3·2	2·9	..	6·1
1935–36	7·6	0·6	8·2	3·0	0·9	0·9	4·8
1936–37	4·9	0·4	5·3	1·3	1·8	3·0	6·1
1937–38	4·1	1·6	5·7	1·5	6·4	1·8	9·7
1938–39	6·6	0·1	6·7	1·7	5·3	5·4	12·4
1939–40	0·5	1·0	1·5	1·0	0·9	18·4	20·3
1940–41	0·9	..	0·9	1·9	0·2	7·7	9·8
1941–42	0·2	..	0·2	0·8	..	1·0	1·8
1942–43	0·1	..	0·1	0·1	..	1·9	2·0
1943–44	..	7·6	7·6	0·1	..	62·3	62·4
1944–45	..	19·6	19·6	..	..	113·2	113·2
1945–46	..	10·5	10·5	2·2	13·9	108·1	124·2

Imports of paddy and rice for 1930–31 *to* 1945–46—cont.

Imports of paddy and rice by rail from other Provinces and States

Paddy in 000 of tons.

Year.	Bihar/Orissa. (14)	Central Province. (15)	Mysore. (16)	Others. (17)	Total paddy. (18)
1933–34	6·9	1·2	1·6	..	9·7
1934–35	10·9	7·1	0·6	..	18·6
1935–36	30·1	19·1	0·4	..	49·6
1936–37	20 0	19·2	2·2	..	41·4
1937–38	26·9	14 0	0·6	..	41·5
1938–39	28·3	10 3	0·8	..	39·4
1939–40	36·6	16 8	1·6	..	55·0
1940–41	16·3	10·1	..	..	26·4
1941–42	12·7	0·4	0·2	..	13 3
1942–43	13·5	0·1	0·1	..	13·7
1943–44	2·2	0·8	..	..	3·0
1944–45	Particulars not available.				
1945–46	Particulars not available.				

Rice in 000s of tons.

Year.	Bihar/Orissa. (19)		Central Provinces. (20)	Punjab. (21)	Bengal. (22)	Others. (23)	Total. (24)
1933–34	12·7		36·2	..	2·5	1·5	52·9
1934–35	4·4		30 3	1·2	..	1·9	37·8
1935–36	14·1		35·9	1·2	..	0·9	52·1
1936–37	10·4		42·6	1·3	0·8	0 6	55·7
1937–38	1·8	48·7	44·7	1·7	15·7	0·4	113·0
1938–39	1 0	39·4	57·7	1·6	4·8	0·7	105·2
1939–40	0·7	27·6	54·8	1·5	2 3	0·6	87·5
1940–41	..	22·9	24·2	1·7	0 4	1·6	50·8
1941–42	0·2	17·6	1·9	1·3	3·0	5·6	29·6
1942–43	..	10·6	4·9	0 7	0·5	1·1	17·8
1943–44	0·1	1·8	23·6	0·1	0·2	0·4	26·2
1944–45	Particulars not available.						
1945–46	Particulars not available.						

Appendix No. 20

[Referred to in paragraph 226]

Export of paddy and rice, 1930-31 to 1945-46

1. *Foreign exports*—000 tons.

Year.	Paddy to Ceylon (others negligible).	Rice. Ceylon.	Rice. Straits Settlement.	Rice. Malaya States.	Rice. Total.
(1)	(2)	(3)	(4)	(5)	(6)
1930-31 ..	3·8	96·6	..	5·5	101·7
1931-32 ..	2·4	56·6	2·8	1·7	61·1
1932-33 ..	2·0	60·2	3·0	1·4	64·9
1933-34 ..	1·1	72·5	4·0	1·6	78·1
1934-35 ..	4·2	66·9	4·5	1·5	72·9
1935-36 ..	4·1	64·4	4·3	1·8	70·4
1936-37 ..	0·7	76·5	5·4	2·0	83·9
1937-38 ..	0·8	79·1	6·9	2·3	88·4
1938-39 ..	2·6	86·4	10·1	2·9	99·5
1939-40 ..	4·2	85·3	8·5	2·4	96·2
1940-41 ..	2·0	103·2	8·9	3·4	115·5
1941-42 ..	25·7	134·0	6·9	2·0	143·5
1942-43 ..	7·7	125·2	..	..	125·2
1943-44 ..	..	25·9	..	..	25·9
1944-45 ..	..	..	..	..	..
1945-46 ..	..	..	..	..	..

2. *Exports to other Provinces and States by sea*

Paddy 000 tons.

Year.	Bengal.	Travancore.	Bombay.	Goa.	Total.
	(7)	(8)	(9)	(10)	(11)
1934-35 ..	..	0·2	..	..	0·2
1935-36 ..	..	..	..	..	..
1936-37 ..	1·8	..	..	0·2	2·0
1937-38 ..	..	0·5	..	..	0·5
1938-39 ..	..	0·1	0·1	1·4	1·6
1939-40 ..	..	..	1·3	..	1·3
1940-41 ..	..	..	..	0·6	0·6
1941-42 ..	..	..	0·5	0·1	0·6
1942-43 ..	..	..	..	..	..
1943-44 ..	..	1·0	..	..	1·0
1944-45 ..	..	6·4	..	..	6·4
1945-46 ..	..	..	..	..	..

Rice 000 tons.

Year.	Bengal.	Travancore.	Bombay.	Goa.	Total.
1934-35 ..	..	0·1	0·3	1·4	2·0
1935-36 ..	..	..	0·3	2·8	3·1
1936-37 ..	2·0	..	0·3	2·8	5·1
1937-38 ..	..	0·1	2·1	1·4	3·6
1938-39 ..	2·2	..	2·4	1·0	5·6
1939-40 ..	0·8	..	3·1	1·7	5·6
1940-41 ..	..	..	2·5	2·2	4·7
1941-42 ..	0·1	..	10·0	1·3	11·4
1942-43 ..	..	..	2·9	1·3	5·1
1943-44 ..	..	0·5	..	..	0·5
1944-45 ..	..	6·2	..	..	6·2
1945-46 ..	..	..	..	..	..

Export of paddy and rice, 1930–31 *to* 1945–46—cont.

Year.		Exports to other Provinces and States by rail.			Others.	Total.
		Bombay.	Nizam's State.	Mysore.		
		(12)	(13)	(14)	(15)	(16)
			Paddy 000 tons.			
1933–34	..	1·1	0·1	0·3	..	1·5
1934–35	..	1·5	0·1	0·8	..	2·4
1935–36	..	1·3	0·2	0·5	..	2·0
1936–37	..	1·2	0·3	0·3	..	1·8
1937–38	..	0·8	0·3	0·1	..	1·2
1938–39	..	0·9	0·2	2·7	..	3·8
1939–40	..	3·2	0·2	2·0	0·2	5·6
1940–41	..	1·0	0·2	1·0	..	2·2
1941–42	..	Particulars not available.				9·3
1942–43	..	1·2	1·8	0·2	..	3·2
1943–44	..	..	..	..	1·5	1·5
1944–45	..	Particulars not available.				
1945–46	..					
			Rice 000 tons.			
1933–34	..	24·8	31·4	42·5	0·3	99·0
1934–35	..	15·5	32·5	72·8	0·4	121·2
1935–36	..	23·0	38·7	77·4	0·5	139·6
1936–37	..	36·8	53·1	47·8	0·7	137·9
1937–38	..	34·6	53·8	43·4	..	131·8
1938–39	..	37·1	60·1	55·5	..	152·7
1939–40	..	41·9	86·0	49·0	1·2	178·1
1940–41	..	44·6	37·7	40·5	0·4	123·2
1941–42	..	Particulars not available.				228·0
1942–43	..	84·5	33·0	25·8	9·8	153·1
1943–44	..	2·2	3·2	8·4	10·2	24·0
1944–45	..	Particulars not available.				
1945–46	..					

APPENDIX No. 21

[Referred to in paragraph 229]

Area under chief pulses in each district, 1936–37 to 1943–44

——	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.	1941–42.	1942–43.	1943–44.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(i) Greengram (00 acres).								
Agency	..	..	..	..	..	..	..	..
Ganjam	..	..	..	..	..	..	..	..
Vizagapatam	156	136	164	127	140	157	158	143
East Godavari	58	56	54	49	54	52	54	52
West Godavari	25	15	23	28	20	27	38	26
Kistna	171	187	244	247	269	252	253	464
Guntur	144	148	173	208	190	187	302	422
Kurnool	58	52	75	70	69	75	77	79
Bellary	187	152	171	184	176	200	215	203
Anantapur	49	46	50	83	45	48	72	61
Cuddapah	4·2	4·5	12	13	42	46	48	43
Nellore	269	240	205	245	228	231	245	226
Chingleput	5	4·3	4	6	5	4	13	3
South Arcot	23	20	30	21	24	25	27	208
Chittoor	6·3	4·4	3·2	3·7	5·3	5·0	3·8	2·4
North Arcot	34	23	28	36	33	41	39	28
Salem	107	94	85	102	90	93	101	88
Coimbatore	81	97	103	125	123	135	148	140
Trichinopoly	20	25	15	16	14	14	25	24
Tanjore	585	474	446	463	507	447	878	802
Madura	9·5	13	51	10	10	11	12	14
Ramnad	35	43	38	37	45	38	47	47
Tinnevelly	169	164	141	132	131	153	155	214
Malabar	22	25	36	20	28	25	19	23
South Kanara	85	85	84	83	84	82	79	89
The Nilgiris	..	..	..	..	..	..	..	..
Total	4,239	3,837	4,204	3,891	4,072	4,224	5,091	5,162
(ii) Redgram (00 acres).								
Agency	..	..	..	..	..	..	..	..
Ganjam	..	..	..	..	..	..	..	..
Vizagapatam	145	191	178	169	190	159	166	178
East Godavari	95	78	97	93	94	95	85	107
West Godavari	58	62	67	61	62	60	67	88
Kistna	65	47	53	51	53	45	50	55
Guntur	232	199	224	211	216	189	210	234
Kurnool	265	257	360	308	316	301	407	421
Bellary	300	272	250	300	305	299	371	365
Anantapur	355	331	453	432	307	363	479	472
Cuddapah	41	26	39	37	42	44	50	70
Nellore	18	16	23	20	21	21	29	32
Chingleput	5·4	2·1	2·6	3·6	4	3	6	3
South Arcot	81	79	82	94	116	81	102	106
Chittoor	41	30	26	32	43	28	29	31
North Arcot	273	295	320	302	391	233	289	327
Salem	166	161	165	194	177	143	171	167
Coimbatore	133	123	98	126	176	139	149	188
Trichinopoly	249	317	278	435	428	325	449	374
Tanjore	74	61	62	65	59	..	..	60
Madura	57	38	42	50	59	59	57	51
Ramnad	80	39	63	15	92	28	69	21
Tinnevelly	90	27	58	24	93	17	52	26
Malabar	38	21	30	35	34	35	53	63
South Kanara	..	..	..	..	..	..	..	..
The Nilgiris	..	..	..	..	..	..	..	..
Total	2,850	2,670	3,069	3,059	3,332	2,607	3,400	3,888

Area under chief pulses in each district, 1936–37 *to* 1943–44 —cont.

—	1936–37. (10)	1937–38. (11)	1938–39. (12)	1939–40. (13)	1940–41. (14)	1941–42. (15)	1942–43. (16)	1943–44. (17)
(iii) Blackgram (00 acres).								
Agency	..	..	..	..	..	..	..	..
Ganjam	..	..	..	..	..	..	..	..
Vizagapatam	161	249	226	239	221	255	229	261
East Godavari	373	359	335	376	372	406	376	427
West Godavari	32	21	21	24	25	26	35	35
Kistna	124	120	119	125	162	139	143	387
Guntur	73	108	138	150	106	113	301	350
Kurnool	27	82	38	29	22	28	36	45
Bellary	1	2	55	3	·8	2·1	2	3
Anantapur	·7	·1	·02	·02	6·2	·4	·3	3
Cuddapah	·8	·7	1	1·2	·9	1·5	3·2	1
Nellore	13	11	12	11	11	14	26	20
Chingleput	34	36	27	58	47	61	147	31
South Arcot	18	35	20	22	22	45	163	153
Chittoor	3	3	1·5	4	7	7·5	6·5	23
North Arcot	55	38	34	53	45	61	78	45
Salem	94	112	49	67	81	110	133	77
Coimbatore	64	71	57	54	70	110	133	111
Trichinopoly	13	15	17	14	20	24	37	31
Tanjore	121	114	113	116	111	111	196	206
Madura	120	129	92	94	87	135	175	137
Ramnad	100	105	97	87	69	92	110	96
Tinnevelly	273	289	269	236	273	248	279	283
Malabar	61	55	47	41	42	63	63	63
South Kanara	121	121	118	125	116	111	111	126
The Nilgiris	..	..	..	..	..	..	..	..
Total ..	1,882	2,026	1,904	1,923	1,917	2,153	2,776	2,914
(iv) Horsegram (00 acres).								
Agency	..	..	..	..	..	..	..	..
Ganjam	..	..	..	..	..	..	..	..
Vizagapatam	1,334	1,357	1,390	1,313	1,449	1,404	1,294	1,118
East Godavari	450	357	789	815	793	822	622	662
West Godavari	828	797	441	470	441	490	478	515
Kistna	299	223	217	279	351	353	216	241
Guntur	400	296	201	345	335	302	264	345
Kurnool	728	599	405	633	643	739	621	844
Bellary	1,002	886	864	1,049	991	1,082	704	715
Anantapur	2,828	2,810	2,315	2,224	2,595	2,964	1,757	2,682
Cuddapah	413	503	367	378	467	544	502	608
Nellore	1,205	1,055	810	968	976	927	1,063	1,181
Chingleput	107	98	35	90	92	81	85	90
South Arcot	78	54	13	41	49	65	50	56
Chittoor	577	495	421	416	407	629	402	430
North Arcot	612	492	223	440	451	628	399	468
Salem	2,406	2,322	1,308	2,058	2,192	2,277	1,989	2,239
Coimbatore	1,989	1,878	993	1,702	1,713	1,792	1,887	2,184
Trichinopoly	346	307	123	210	248	246	248	268
Tanjore	5	4·6	4 6	6·7	6 0	5·6	21	7
Madura	885	828	410	646	691	732	764	800
Ramnad	135	149	127	184	124	134	165	110
Tinnevelly	680	725	443	552	488	546	625	674
Malabar	38	31	34	31	37	40	38	29
South Kanara	243	234	231	229	225	224	234	286
The Nilgiris	·1	·1	·1	·1	·1	·1	·2	·5
Total ..	17,591	16,473	12,167	15,037	15,759	17,029	14,469	16,501

Appendix No. 22

[Referred to in paragraph 229]

Estimate of total requirements of pulses, 1945

District.	Green-gram.	Black-gram.	Red-gram.	Horse-gram.	Bengal-gram.	Other pulses.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.	TONS.
Vizagapatam ..	3,800	5,600	12,100	8,100	5,800	3,600	39,000
East Godavari ..	2,200	3,200	6,800	4,500	3,300	2,000	22,000
West Godavari ..	1,400	2,000	4,400	2,900	2,100	1,300	14,100
Kistna	1,500	2,100	4,600	3,100	2,200	1,400	14,900
Guntur	2,300	3,300	7,200	4,800	3,400	2,200	23,200
Nellore	1,600	2,300	5,100	2,400	2,500	1,500	15,400
Kurnool	1,100	1,700	3,600	2,400	1,700	1,100	11,600
Cuddapah	1,100	1,500	3,300	2,200	1,600	1,000	10,700
Bellary	1,100	1,500	3,300	2,200	1,600	1,000	10,700
Anantapur	1,200	1,700	3,700	2,500	1,800	1,100	1,2000
Chittoor	1,600	2,400	5,200	3,400	2,400	1,500	16,500
North Arcot ..	2,600	3,800	8,200	5,500	4,000	2,500	26,600
Salem	2,900	4,200	9,200	6,100	4,400	2,700	29,500
Coimbatore	2,800	4,100	8,900	6,000	4,300	2,700	28,800
Chingleput	1,800	2,600	5,700	3,800	2,800	1,700	18,400
Madras	800	1,200	2,500	1,700	1,200	700	8,100
South Arcot ..	2,600	3,800	8,200	6,400	3,900	2,400	27,300
Tanjore	2,500	3,700	8,000	5,400	3,900	2,400	25,900
The Nilgiris	200	300	700	400	400	200	2,200
Madura	2,400	3,500	7,700	5,100	3,700	2,300	24,700
Trichinopoly ..	2,200	3,200	6,900	4,600	3,300	2,100	22,300
Ramnad	2,000	2,800	6,200	4,100	3,000	1,900	20,000
Malabar	3,900	5,700	12,400	8,300	6,000	3,700	40,000
South Kanara ..	1,500	2,200	4,800	3,200	2,300	1,400	15,400
Tinnevelly	2,200	3,200	7,100	4,700	3,400	2,100	22,700
Total ..	49,300	71,600	155,800	103,800	75,000	46,500	502,000

Appendix No. 23

[Referred to in paragraphs 255, 260 and 283]

A scheme for improving the Ongole breed of cattle in the Madras Province

Introduction.—The Ongole breed is the only satisfactory 'dual-purpose' breed in this Province. In the past, Ongole cattle were in demand even in foreign countries, especially South America, but at one time this drain was considered so great that it was thought advisable to stop it compulsorily. More recently the industry has declined owing to the absence of large individual breeders on the one hand, and the deterioration of fodder and grazing facilities on the other. The latter circumstance has been due to the gradual increase in the acreage under commercial crops in the breeding tract, resulting in loss of fodder, as well as an encroachment on grazing grounds and porambokes by cultivation.

It has been suggested that a scheme should be formulated for intensive production of this breed and that the target might well be fixed at 100,000 Ongole bulls and 100,000 Ongole cows every year. I have had a discussion with the Livestock Development Officer and along with him and the District Forest Officer, Guntur, have met the leading cattle breeders of the Ongole tract. The Director of Veterinary Services also has been consulted.

Statement No. A-1 gives the number of cattle according to the 1940 census in the Ongole area.

According to this census there were in the Guntur district 195,789 male animals and 130,251 female animals. Two thousand and eighty-eight of the former were breeding bulls. Fifty-three thousand seven

hundred and ten of the cows were in milk and 58,252 were dry. The proportion of Ongole to the total cattle population in Guntur was found in 1936–37 to be 7·18 per cent. On this basis the Ongole should have been about 141,000 males, 93,780 females, 1,503 breeding bulls, 38,566 cows in milk and 41,825 dry cows. Assuming that a cow calves in alternate years, there should to attain the target always be a minimum of 400,000 effective cows in milk or dry. The number should be 450,000, if casualties are allowed for. The number according to the 1940 census was 94,000 and has to be increased five times to attain the target indicated. In all probability, the actual number at the present day is even less and the work to attain the target will be correspondingly heavier and more costly. As against this the cattle of the Ongole breed available in the neighbouring districts can be taken as a compensating factor to some extent.

2. *Breeding area for the scheme.*—The first point to decide is the area to be demarcated for the development of the Ongole breed. It is generally agreed that the Ongole taluk and especially the area lying between the Paleru and Gundlakamma rivers has for long been the centre of the breeding industry for this particular breed. The areas where this breed is extensively used and where necessarily breeding also takes place to some extent embrace the districts of Kurnool, Kistna, Nellore and Cuddapah also. It however, seems as if the rearing of breeding bulls is not very common in these outlying districts but that breeding bulls are taken from the Ongole tract for service in these places. The cattle breeders of Ongole are definitely of the opinion that those other areas are not suitable for developing the breeding industry but the District Forest Officer is of the view that the Nallamalai forests are quite suitable and that proper direction and encouragement have alone been lacking. This view is shared by the Livestock Development Officer also. The Director of Veterinary Services prefers concentrating the breeding industry in and about Ongole on the ground that 'forest breeding' which alone is possible in Kurnool has not generally been satisfactory. The question whether the breeding industry should be concentrated round about Ongole and the bulls distributed to the various outlying districts or whether breeding industry should be split up into convenient units in those other districts also is a matter to be considered carefully. From a lay point of view the spreading out of the breeding area seems desirable. The outlying areas may not at first produce the best type but this will be the beginning of a desirable local grading up. It is anyhow necessary that the position obtaining in the districts of Guntur, Kurnool, Cuddapah, the upland tracts of Kistna and the northern taluks of Nellore should be considered for the purpose of demarcating the Ongole breed area. Statement No. A-2 gives the areas in those districts classified under the heads "forests," etc., and Statement No. A-3 the total areas grown with food crops, fodder crops and non-food crops.

3. *Cattle census.*—(1) A survey of the Ongole tract was made in 1927–1928. Eight hundred and forty-four villages were visited. There were 93,000 cows and 670 breeding bulls, that is to say, about 300 breeding bulls short of requirements. There were 316 villages with no breeding bull at all.

(2) At the instance of the Imperial Council of Agricultural Research Sri T. Seshachalam Nayudu, Supervisor, made in 1935–37, a village enquiry in the Ongole area about the cattle and the production and consumption of milk. The enquiry was made in 50 villages selected

at random in 14 taluks of the Kistna, Guntur and Nellore districts. The investigation covered 1,000 holdings and 2,248 cows, of which 1,512 or 67·2 per cent were Ongoles and 2,631 bulls and bullocks, of which 1,852 or 65 per cent were Ongoles. The average holding was 20–30 acres, the net area sown 26·60 acres the area under cereals 16·49 acres and the number of animals 12·1. Even the straw required for the maintenance of the animals was far below the requirements. The average milk yield per day was 5·0 lb. the average period of a cow in milk was 4·9 months, the yield per lactation was 1,324 lb. and the average dry period 9·7 months. The quantity of milk used by the ryots was negligible.

(3) A proper census of the cattle in the districts of Guntur, Kurnool, Cuddapah, the upland tracts of Kistna and the northern taluks of Nellore is necessary. The Ongoles and non-Ongoles in these tracts will have to be enumerated separately for this purpose. The breed characteristics laid down for the Ongole by the Imperial Council of Agricultural Research will have to be followed in identifying the Ongoles. As regards the non-Ongoles, a decision will have to be arrived at whether they should be rejected in toto or whether one or more of them having distinguishing characteristics and breeding true to type should also be taken up for development. It has for example been suggested that the red and white breed called Devarakottah or Balapattah is suitable for development.

The 'dual purpose' of this breed should not be neglected. The census should be so taken as to enable the ryots and officers to separate the best milkers so that breeding may be suitably concentrated later. In other words, while the Ongole may be generally a dual purpose animal, breeding work should be so conducted as to separate the animals in which the milk yield predominates and to evolve within the main Ongole brand two sets, a draught set and a milk set. Unless the separation is made, the result will be the evolution of animals which produce the best average but not the optimum for each purpose.

The only agency which will be capable of taking the census within a reasonable time is the village establishment. A printed form can be given to them with instructions how to empower it. I have prepared a form for this purpose (Appendix A-4) which may be printed in Telugu as well as in English. The work must be supervised by Special Revenue Inspectors at the rate of one for each taluk, to work under the District Veterinary Officers concerned. It may be necessary to have two Revenue Inspectors for the Ongole taluk. The Revenue Inspectors will check the work done by the village officers, post the figures for their respective areas and send the posting statement with the village officers' reports to the District Veterinary Officers, who will consolidate the figures for their jurisdiction and send them with their remarks to the Livestock Development Officer. The officer will consolidate the figures for the entire area and send them with his remarks to the Government through the Director of Veterinary Services, together with a plan showing the areas in which the scheme can be worked successfully. The Livestock Development Officer will have to visit the area and examine the census work when it is being taken, so as to be in a position to transmit the census figures immediately after receipt, with a proper covering report. The Director of Veterinary Services will submit the Livestock Development Officer's report with his own remarks on each suggestion.

The cost on account of the employment of the Special Revenue Inspector for three months is Rs. 15,000 (Appendix A-5).

4. *Fixing the target.*—The census will give information about the breeding bulls now in use, the number of cows, suitable bull calves and heifer calves. With these data, it has to be decided whether the number of breeding bulls (which can be recognized) is sufficient for the cows in each area in the tract and then measures taken for increasing the number of breeding bulls. The elimination of scrub bulls should go on simultaneously with the increase in and supply of breeding bulls to the required number. It will not be proper to castrate the scrub straight-away as this will result in a sudden diminution in the number of breeding bulls in the area, but as and when proper breeding bulls are supplied, these will come up for elimination. On the supply side the rate of development of good breeding bulls will depend on two factors—on the one the number of good dams which are available for breeding purposes and on the other the number of years within which it is proposed to attain the target. In view of the fact that the supply of good Ongole cattle has not kept pace with the demand for them, aiming at attaining the target in the immediate future will render the scheme unworkable. At the same time an unduly long period will make for dissipation of energy and a certain obscuring of the objective.

A statement has been prepared in considerable detail [Statement B (1) (*a*)] showing the position starting with one work bull. It has been considered possible with one bull to produce 125 breeding bulls in ten years in a Government farm, if certain conditions are satisfied. The number is 2,500 for a target of fifteen years.

The presumptions on which the figures have been worked out are as follow :—

There are to be 55 cows for each breeding bull. In order to avoid complicated calculations at every stage, 10 per cent of the services are allowed for as unsuccessful and as due to death or disablement of calves after births. That is to say, the number of calves that each breeding bull will produce every year is 50. One-half of this number is presumed to be bull calves and the other half heifer calves. Twenty-five per cent of the bull calves are presumed to be fit for breeding purposes. The cows are to be served and are supposed to calve in alternate years. The 55 cows served in the first year will not therefore be available for service in the second year and a fresh set of 55 is necessary for the second year. If breeding is avoided by the introduction in the scheme of a fresh breeding bull in the fourth year when the first year heifers become ready for service. The number of these heifer calves being only 25, new cows will have to be purchased so as to make up the required number of cows for the new breeding bull.

Of the bull calves, the 75 per cent considered unfit for breeding purposes will be castrated in their second year and such of them as are not required as work bullocks on the farm will be sold.

There will be no purchase of cows for breeding in the farm in the third year and from the fifth year onwards. There will always be a small number of heifers and cows born in the farm fit for service every year. The balance required for service by the steadily increasing number of breeding bulls in the farm will be carefully selected from among the true breeds in the parts round the farm. The particulars that the village officers would have gathered at the census about the heifer calves—vide column (9) of Statement A-4—will be of help in making this selection. Further enquiries are necessary and should be made sufficiently in advance of the requirements of each year from the fifth

year onwards when the first set of private cows will be required for the scheme. In the case of the cows thus selected for service by the breeding bulls at the Government farm service in alternate years will be the rule and allowance will be made for 10 per cent unsuccessful service, etc., as in the case of the cows which the scheme starts. No cow, either of the sets purchased in the first two years or of the ryots selected for service, is to be served at the farm in more than three alternate years. The cows introduced in the first and second year of the scheme are to be sold out of the farm in the sixth and seventh years respectively. The bull with which the scheme starts should be sent or sold out of the tract in the sixth year. Similarly each set of breeding bulls and cows is to be sent or sold out of their particular tracts after the period fixed for each is over. Records are to be kept in sufficient detail to prevent inbreeding even within this period.

When private cows are allowed service by the breeding bulls in the farm, it should be made a condition that the Government is to have the first refusal of the calves born. The female calves taken over by the Government will be reared at the Government farms and will be sold after crossing by the farm bulls before or after the calves are born. Such of the bull calves as are considered fit for breeding or work purposes will be taken over by the Government for supply to needed areas and the others castrated.

In order that owners of cows around farms may be encouraged to have their names enrolled for the service of their private cows by the farm breeding bulls and in order that the Government may have the power to enforce the transfer to the Government of such of the calves as are needed, these owners may be paid a premium of Rs. 10 per mensem for each cow beginning from the fifth month from the date of service by the farm bull till the calf is born and Rs. 15 for each cow and calf till the calf is ten months old. Necessary conditions to secure these objects should be laid down.

The progress in production is meagre at the beginning but there is rapid acceleration from about the eighth year. It has been found that the target suggested above can be reached in 15 years with three breeding bulls to start with.

5. *Scheme for working.*—It is neither desirable nor practicable to have the work done solely through Government agency. For one thing, the policy should be to revive the cattle-breeding industry of the tract, which has now been neglected for some decades. At some stage or other, the industry will have to stand on its own legs and be carried on by breeders as in the past. The cost also will be less when the work is done by private persons. If the work is done solely by Government, quite a large number of farms will be necessary to house the thousands of animals contemplated in the scheme. Allowing for pay, allowances, housing accommodation for the large staff and the thousands of animals and for maintenance, the total cost of attaining the target figures will, it is estimated, be in the neighbourhood of Rs. 17 crores if the scheme is to be worked through Government agency only (Statement B-4). In working out these figures credit has been taken for every possible item of income.

What is necessary therefore is a scheme in which Government take the initiative and then allows it to expand in such a way that all the possible sources of development—private breeders, private breeding farms, co-operative cattle breeding societies, individual premium holders,

local bodies, religious institutions and the like are suitably encouraged and fully utilized.

6. Various concessions are now given by the Government for improvement of livestock, such as the premium scheme, assistance to local bodies, co-operative societies and private breeders, maintenance of stud bulls in veterinary institutions, etc. The conference that I had with the breeders in the Ongole area indicated, however, that they were not fully aware of many of these. In respect of these methods of Government aid, what seems to be necessary is more drive and greater enthusiasm. The items of work to be done can be classified under the following heads :—

I. Drive for encouraging the premium scheme and for payment of subsidies to all bodies and institutions that can be suitably roped in.

II. Starting co-operative societies on the Anchetti model.

III. Purchase and maintenance of breeding bulls by co-operative societies in the area from out of their Common Good Fund.

IV. Selection of private breeders and assisting them to revive and carry on the industry.

V. Maintenance of Government farms.

7. *Premium scheme and subsidy.*—Under this head the work proposed falls under (*a*) intensification and (*b*) expansion so as to include a number of institutions.

The census contemplated in paragraph 3 above, would have shown how many bulls there are in each village under the premium scheme and how many more can be brought under the scheme. Every effort should be made to bring the latter into the scheme.

Local bodies in the tract should be persuaded to apply for Government assistance in purchasing and maintaining breeding bulls. Such bulls should be supplied to them as they become available in the Government farms.

Other institutions like mutts, and temples should be roped in by persuasion.

8. *Cattle-breeding societies.*—Societies on the Anchetti model should be started whenever the particulars collected at the census indicate the possibility of doing so with advantage. Such societies will be given extra facilities, such as free supply of a limited number of stud bulls, a small extent of not more than 10 acres for raising fodder crops and pasture, a grant towards construction of buildings and the like. A copy of the by-laws for such a society is given in Appendix A-6.

9. *Other co-operative societies.*—Every co-operative society should have at least one stud bull of its own, purchased and maintained from out of its Common Good Fund. More bulls than one should be maintained wherever conditions permit.

10. *Private breeders.*—By far the best results can be obtained only through the co-operation of breeders. It is to them that the Government have to look for the revival of the industry and for the steady and unfailing supply of the requisite bulls, cows and bullocks once the target has been reached and the active assistance given by the Government in various farms is rendered needless. The form of the report of the special census in Appendix A-4 has been designed to be of the use in making a selection of these breeders. The special staff engaged in this scheme, whether belonging to the farm or otherwise, should have a register of the breeders in their respective jurisdictions prepared from the census reports. It will be their duty to keep the register up to date

and to add to it as cases of hereditary and/or professional breeders come to their notice.

Intensive propaganda will be carried on for the revival of the industry by the special staff of the scheme from very beginning. The needs of the existing breeders for pure-bred animals will be noted and met as far as possible expeditiously. Steps will be taken to remove any obstacles brought to notice by these breeders. Wherever necessary or desirable, each breeder will be given at least two breeding bull calves considered fit for breeding. A small area, not more than 10 acres, will also be given if available for use as pasture ground and for growing fodder. A grant will be given for the maintenance of the animals. To enable the breeder to display a live interest in the animals with him, it is necessary that he should spend some money from his own pocket on their maintenance. Allowing for this and for a lesser cost of maintenance by a private person than by Government, the grant for maintenance will be Rs. 200 on the average per annum per animal with the breeder. The advance for the purchase of the animals will be recovered three years after it is made, this being the proper period by which to sell the animal. It will be noticed that a breeder is treated very much like a breeding society. This is a point of some importance. The minimum qualification for a breeder should be two breeding bulls. This will mean that he will have to canvass in the area for 110 cows every year.

11. *Government farms.*—A few Government farms will be needed within easy access of every breeder not only to serve as demonstration farms but to supply the bulls, etc., needed for the scheme.

At the Lam Farm in Guntur, there were last year 3 stud bulls, 71 cows and 40 calves, of the Ongole breed. Provision was made recently for the expansion of the farm by 130 acres and for the increase of the stock there. The animals required for starting the scheme can be selected from this stock and the scheme started immediately. The scheme animals will be kept distinct from the others in the farm, where the present work will continue to be done.

As cattle-breeding societies increase in number, more bulls are admitted into the premium scheme and private breeders are entrusted with animals, the work in each farm is bound to increase and a new farm should be started to deal with the increasing demands and to take up work in fresh areas. It is anticipated that an additional farm may have to be opened in each of the 2nd, 4th, 5th, 6th and 7th year of the scheme. The places where these additional farms can be located with advantage may be selected from the information gathered at the special census. However, in regard to the second farm which has to be started in the second year, an area round about Ongole may have to be selected sufficiently early. For this purpose, I have prepared a map * of the area showing the cattle figures and a statement (Appendix A-7) showing the land available. *Prima facie*, taking both these factors into account, Allar, Kothapatnam or Addanki (North) seem suitable areas.

The scheme provides for six Government farms in eight years.

12. *Grazing areas.*—It has been noticed that deterioration in the cattle-breeding industry is due, among other causes, to the general increase in area under commercial crops resulting in reduction of fodder resources as well as encroachments on grazing grounds and other porambokes by cultivation. The improvement of the industry is dependent

* Not printed.

on improvement in the supply of fodder and pastures. There is a separate scheme for the establishment of village forests which when introduced will benefit this tract also.

The needs of food crops, commercial crops, and animal husbandry have to be properly balanced. From the point of view of the ryot a good price for his tobacco is as important as a good price for his bull or cow. To what extent the scheme calls for acquisition for pasture purposes for Government farms, breeding societies and breeders is a matter for consideration after selecting the areas for Government farms and the particular societies and breeders. The availability of good Government waste land which is straightaway or potentially good grazing ground should be a leading consideration in selecting an area for breeding purposes. Concessions by way of revenue remission can be given in areas selected for intensive work, for the growing of fodder crops. Along with each Government farm there should be a touring unit to teach ryots proper methods of fodder preservation.

13. *Result of scheme.*—For all practical purposes, each institution or person mentioned in the previous paragraphs and maintaining one or more stud bulls may be treated as a breeder. It should be possible to select 200 such breeders by the eighth year. Adopting the same conditions of production presumed in paragraph 4 above the progress of work is indicated in Statement C-3. There will be during the eighth year—

(1) Breeding bulls		3,000
(2) Bull calves fit for breeding—		
Two years old	4,200	
One-year old	7,500	
Less than one year	18,750	
		30,450
(3) Other bull calves—		
Over one year old	22,500	
Less than one year	56,250	
		78,750
(4) Heifer calves—		
Two years old	16,500	
One year old	30,000	
Less than one year old	75,000	
		121,500
(5) Work animals—		
Five years old	1,690	
Four years old	6,750	
Three years old	12,300	
		20,740
	Grand total ..	254,440

The target is thus reached in the eighth year and the intensive work carried on till then can be dropped little by little keeping ultimately only the minimum staff and equipment necessary for continuing production.

14. *Work to be done and the staff.*—The normal work of a livestock farm, such as milk recording, and maintenance of pedigree books, will have to be done at the Government farms. The areas round each farm will have to be frequently visited and the pedigree cows owned by the ryots there selected for service by the bulls at the farm or with approved breeders and institutions. Propaganda is essential especially at the beginning about the objects of the scheme and the facilities which the Government intend to give, about the necessity for pasture grounds and the cultivation of fodder. The co-operation of ryots in the gradual

elimination of scrub bulls should be achieved and resort should be had to the provisions of the Livestock Improvement Act only when absolutely necessary. There should be no unapproved bull left uncastrated when the supply of approved breeding bulls is sufficient for the needs. Local bodies should be persuaded to apply for Government assistance for the purchase and maintenance of bulls. Steps should be taken in consultation with the local officers of the Co-operative Department to form societies on the Anchetti model and to persuade other co-operative societies to invest on breeding bulls. As many bulls as possible should be brought in under the premium scheme. The private cows served by the approved bulls will have to be inspected to see that they are maintained properly in accordance with the conditions laid down for the purpose. Calves born to approved bulls will have to be purchased if required for the scheme. The register of breeders will have to be kept up to date and their stock frequently inspected.

Most of these items of work will have to be done by the farm staff at the initial stages. As the number of breeders and institutions increase, a special staff will be necessary to make frequent inspections of the animals so as to see that the conditions of grant are strictly followed. Assuming that each breeder has to be visited once a month and that each visit takes two to three days, an inspector can visit eight breeders a month. Twenty-five inspectors with the requisite direction, clerical and menial staff will be required as shown in Statement C-1.

15. *Improvement of conditions on the Nallamalais.*—The practice of sending cows to the hills from the Ongole tract is a long-established one. The main tract to which animals are sent are the Nallamalais, the average number sent every year being about a lakh and half of cattle. Every effort should be made both on the veterinary side and the cattle-breeding side to improve the conditions in that area. The following is a summary of the work already done in that area :—

(1) Two families of Sugalis were trained at Hosur in cattle feeding and management, clean milking, curd and ghee manufacture and poultry breeding ;

(2) three Kangayam breeding bulls were stationed at Panyam on the Yeramalai Hills for serving the cows of the Sugalis. No fee was levied for the service ;

(3) the Kangayam bulls were replaced by Ongole bulls in 1943 ; and

(4) grazing fees have been reduced by one half.

It however seems that conditions are far from satisfactory, partly because the Sugalis who are in charge are uneducated and ignorant of modern methods of breeding and partly because sufficient facilities do not exist at present in these forests either to control promiscuous breeding or to tie the cattle in proper herds in specified area. The cattle there are tied in what are called pentas and the failure to remove the dung from these pentas causes diseases to the cattle. On the whole therefore while the existing conditions give relief to the main breeding areas in regard to the maintenance of these cattle during the off-season they are not looked after satisfactorily in the places to which they are sent. From the point of view of cattle breeding, the chief difficulty arises out of the large number of cattle that have to be provided for. If all the thousands of cattle are to be crossed systematically in the various grazing areas then some hundreds at least of breeding bulls will be required. This obviously cannot be done now. The present system of having a few breeding bulls with the Sugalis does more harm than good, because the crossings

generally become unregulated and from the point of view of the improvement of the breed is unsatisfactory. The present activities may therefore be confined to formulating plans for the improvement of living conditions of the cattle there. It will fall roughly under—

(*a*) provision of suitable rotational grazing areas ;
(*b*) provision for drinking facilities ;
(*c*) provision of veterinary aid ;
(*d*) provision of penning facilities ; and
(*e*) arrangements for the removal of accumulated dung and using it as manure where it is needed.

A committee consisting of the Director of Veterinary Services, the Chief Conservator of Forests, the Chief Engineer for Irrigation and the Joint Secretary to Government, Development Department, may be constituted to examine these questions in the light of past experience and future needs. A preliminary departmental investigation on each of these points may be made before the committee can start its work. The question of breeding in the area itself can be taken up as the second part of the programme.

16. *Cost.*—The expenditure involved in working the scheme through breeders is as shown below :—

——	Ultimate cost.		For eleven months of first year.	
	Non-Recurring.	Recurring.	Non-Recurring.	Recurring.
(1)	(2)	(3)	(4)	(5)
	RS.	RS.	RS.	RS.
Supervision staff	..	3,10,000	..	24,000
Farm staff	7,00,000	5,80,000	1,20,000	50,000
Fodder demonstration staff ..	..	52,000	..	6,800
Total ..	7,00,000	9,42,000	1,20,000	80,800

besides an amount of Rs. 69,86,250 paid to breeders out of which Rs. 7,08,750 will have been recovered in the eighth year of the scheme.

S. Y. KRISHNASWAMI,
Joint Secretary to Government.

20th June 1945.

A. GENERAL

1. *Livestock census—January* 1940

——	Cuddapah.	Guntur.	Kurnool.	Kistna.	Nellore.
(1)	(2)	(3)	(4)	(5)	(6)
I. Males—					
(*a*) Breeding bulls, i.e., entire males over three years kept for breeding purposes only	1,773	2,088	358	4,169	836
(*b*) Working bullocks ..	184,843	186,271	121,986	141,725	199,351
(*c*) Uncastrated males over three years kept both for work and breeding	..	709	33,951	7,114	12,185
(*d*) Bulls and bullocks over three years not in use for breeding or work.	18,736	6,721	33,893	10,126	13,791
(*e*) Total males over three years	155,852	195,789	190,188	163,134	226,163
II. Females—					
(*a*) In milk	38,840	53,710	41,116	50,004	73,201
(*b*) Dry	43,087	58,252	37,837	56,434	106,600
(*c*) Not calved	5,320	14,497	18,772	33,104	56,549
(*d*) Total	87,247	126,459	97,725	139,542	236,350
(*e*) Cows over three years used for work only ..	1,884	1,371	808	3,126	2,187
(*f*) Cows over three years not in use for work or breeding purposes ..	3,182	2,421	1,022	3,100	3,843
(*g*) Total females over three years	92,268	130,251	99,555	145,768	242,380

——	Cuddapah.	Guntur.	Kurnool.	Kistna.	Nellore.
(1)	(2)	(3)	(4)	(5)	(6)
III. Young stock—					
Under one year—					
(a) Male	14,463	23,620	19,711	23,434	32,780
(b) Female	15,043	23,686	20,085	23,186	34,571
(c) Total	29,506	47,306	39,796	46,620	67,351
One to three years—					
(a) Male	12,885	25,394	18,969	26,594	33,456
(b) Female	12,361	31,078	16,864	27,114	37,601
(c) Total	25,246	56,472	35,833	53,708	71,057
Total three years and under—					
(a) Male	27,348	49,014	38,680	50,028	66,236
(b) Female	27,404	54,764	36,949	50,300	62,172
(c) Total	54,752	103,778	75,629	100,328	138,408
IV. Total cattle—					
(a) Male	182,700	244,803	228,868	213,162	292,399
(b) Female	119,667	185,015	136,504	196,068	314,552
(c) Total	302,367	429,818	365,372	409,230	606,951

2. *Classification of area in* 1942–43 *in the five districts where the breeding areas may be located*

Forests—					
Area	1,156,068	457,003	1,647,878	126,046	468,933
Percentage to the total area ..	30·4	12·2	33·8	5·7	9·2
Not available for cultivation—					
Area	453,214	485,160	293,457	436,868	1,600,173
Percentage to the total area ..	12·0	12·9	6·0	19·7	31·5
Other cultivated land excluding current fallows—					
Area	894,632	284,600	626,936	244,741	985,621
Percentage to the total area.	23·6	7·6	12·9	11·0	19·4
Current fallows—					
Area	246,328	526,736	220,842	244,721	727,900
Percentage to the total area.	6·5	14·1	4·5	11·0	14·3
Net area sown—					
Area	..	..	..	..	..
Percentage to the total area ..	27·5	53·2	42·8	52·6	25·6
Total ..	3,790,752	3,748,460	4,872,843	2,222,217	5,087,200

3. *Area grown with crops*

District.	Total food crops, 1942-43.	Fodder crops, 1942–43.	Total non-food crops, 1942–43.
Cuddapah	855,847	..	275,328
Guntur	1,710,127	93,014	682,692
Kurnool	1,527,411	1,107	614,809
Kistna	1,020,294	63,830	241,055
Nellore	1,357,613	35,429	152,748
Total ..	6,471,292	193,380	1,966,632

4. *Ongole cattle census*, 1945

——	District.	Taluk.	Number.	Village.
1 Name of breed				
2 Number of breeding bulls in the village ..				
3 Number of bullocks in the village				
4 Number of bull calves in the village—				
(a) Between two and three years of age ..				
(b) Between one and two years of age ..				
(c) Below one year				
(d) Number out of those in (a) that will be fit for breeding purposes				
(e) Particulars about bull calves of the best draught capacity				
5 Number of cows in the village				
6 Number of cows in milk				
7 Number of cows not now in milk but which may give milk later				

—	District.	Taluk.	Number.	Village.
8 Number of cows beyond the stage of giving milk.				
9 Number of heifer calves in the village—				
(*a*) Between two and three years of age ..				
(*b*) Between one and two years of age ..				
(*c*) Below one year				
10 The largest quantity of milk given on any day by the best cow—				
(*a*) Name of owner				
(*b*) Particulars for identifying the cow ..				
(*c*) Quantity of milk given				
(*d*) Date of that milking				
(*e*) Particulars about the calves of that cow				
11 Names and addresses of professional breeders in the village—				
(*a*) Name				
(*b*) Address				
(*c*) Number of breeding bulls maintained.				
(*d*) Whether approved by Government ..				
(*e*) Number of animals normally bred in a year				
(*f*) Any arrangements made by the breeder for producing a good milker or a good draught animal and particulars about such animals, if any				
(*g*) Extent of land—				
(i) Owned and cultivated with fodder				
(ii) Used for pasture				
12 Approved breeding bulls in the village—				
(*a*) Names of persons having custody and number with each				
(*b*) For how long each animal has been at stud				
(*c*) Average monthly service of each ..				
(*d*) Any record of calves born				
13 Total extent of land cultivated with fodder crops in the village during the previous fasli				
14 Total yield of the above crops				
15 Survey numbers and extents of lands used as—				
(*a*) Pasture—Private or public				
(*b*) Cattle stand—Private or public ..				
16 Survey numbers and extents of land that can be—				
(*a*) Cultivated with fodder				
(*b*) Used as pasture				
(*c*) Used as cattle-stand				
17 Animals usually sent outside the village for grazing—				
(*a*) Number				
(*b*) Where sent				
(*c*) Facilities available there				
(*d*) During which period of the year ..				

Place

Dated

Signature of { Village Headman.
Karnam.

I have checked the particulars above and certify to their correctness.

2. The following suggestions are made about the position of pasture grounds, fodder, etc., for this village :—

Camp

Special Revenue Inspector,

Dated

Instructions.

1. A separate form should be used for each district breed.

2. Animals which cannot be identified as belonging to any particular breed may be shown under one head " Miscellaneous. "

5. *Cost of employment of Special Revenue Inspectors*

Number of men to be employed.

District.	Taluk.	Number.
Guntur	Ongole	2
	Other taluks one each	8
Kurnool	....	9
Cuddapah	....	9
Kistna	....	5
Nellore	....	6
	Total ..	39

——	Ultimate cost.	Cost in 1944–45 (for three months).
I. Pay—	RS.	RS.
39 Revenue Inspectors at Rs. 30 per mensem each (average Rs. 42—1/12)	4,957	3,510
39 Peons at Rs. 12 per mensem each (average Rs. 14·7)	1,720	1,404
II. Travelling allowance—		
39 Revenue Inspectors at Rs. 40 each per mensem.	18,720	4,680
39 peons at Rs. 10 each per mensem	4,680	1,170
III. Dearness allowance (roughly)	10,000	3,000
IV. Contingencies and unforeseen expenditure	4,923	1,236
Total ..	45,000	15,000

6. *Model by-laws of a Cattle-Breeding Co-operative Society*

Name, constitution and address—

The Cattle-Breeding Co-operative Society, Limited, No. is registered as a co-operative society under the Madras Co-operative Societies Act (VI of 1932). Its address shall be village, post in the taluk of in the district. Its operations shall be confined to

Objects

2. The objects of the society shall be to promote the economic interest of its members—

(1) by improving their methods of cattle-breeding ;

(2) by diffusing amongst them up-to-date information in the matter of cattle-breeding ;

(3) by arranging for the grazing of their cattle ;

(4) by arranging for the joint purchase and the joint sale of cattle required or possessed by them ; and

(5) by the provision of educational assistance to the members, especially in cattle-breeding.

Membership

3. The liability of the members shall be limited to the share capital subscribed by them.

4. The capital of the society for the present shall be made up of shares at the rate of rupees each. The entire share value should be paid in full on allotment.

5. Any person over 18 years of age who is competent to contract residing within the limits referred to in the third sentence of by-law 1 and who owns one or more cows or bulls shall be eligible for admission as a member but no person can claim admission as a matter of right.

6. Applications for admission as members and for allotment of shares shall be made to the Secretary in the form, if any, prescribed by the society for the purpose. Every such application shall be disposed of by the Board of Directors who shall have power to grant admission or to refuse it without assigning reasons.

7. Every member shall pay an entrance fee of anna one on admission.

8. No member shall be permitted to withdraw his membership from the society within one year from the date of his admission, but a member may withdraw from the society after this period with the consent of the Board of Directors provided firstly that he has given at least three months' notice of withdrawal and secondly that there are no moneys due by him to the society either on his own account or on account of others.

9. Should a member cease to be eligible for membership either on account of the removal of his residence from the limits prescribed in by-law 1 or on account of ceasing to own a cow or for any other cause, the society shall remove his name from the list of members after recovering from him any moneys due to the society either on his own account or on account of others.

10. If a member dies, his membership shall *ipso facto* cease.

11. (1) A past member shall be liable, as provided in by-law 3, for the debts due by the society, as they existed on the date when he ceased to be a member, for a period of two years from such date.

(2) The estate of a deceased member shall be liable, as provided in by-law 3, for the debts due by the society as they existed on the date of his decease, for a period of two years after his decease.

12. No member shall be permitted to transfer his share or shares or create a charge in respect of the same in favour of another member or person except with the previous sanction of the Board of Directors.

Funds

13. The society shall ordinarily obtain funds from the following sources :—

(1) Entrance fees and share capital,
(2) Fees or contributions levied under by-law 38 and
(3) Grants from Government or other sources.

Management

14. Subject to such resolutions as the general body may from time to time pass the executive management of the affairs of the society shall vest in a Board of Directors consisting of not more than members.

15. The members of the Board of Directors shall be elected by the general body for a period of three years from among the members. Members of the Board of Directors shall continue in office after the expiry of their term of office until by election another board is constituted. A retiring member of the Board of Directors shall be eligible for re-election. After the Board of Directors is elected by the general body they shall elect from among themselves, a President and a Secretary. Interim vacancies on the Board of Directors may be filled up by the remaining members of the Board by co-option for the unexpired portion of the period. Any member or members of the Board of Directors may at any time be removed by a resolution of the general body.

16. The Board of Directors shall meet once a fortnight or oftener if necessary to conduct the affairs of the society. No decision of the Board of Directors shall be valid unless it is assented to by at least members. All questions before the Board of Directors shall be decided by a majority of votes. Should there be an equality of votes, the president or other presiding member shall have a casting vote. No member of the Board of Directors shall be present at a meeting of the

Board when any matter in which he is personally interested is being discussed. In cases of urgency where there may not be sufficient time to convene a meeting of the Board of Directors, and in all cases in which the Board of Directors, the Secretary may obtain the orders of the Board of Directors by circulation of papers among the members present at the headquarters of the society. Such decisions arrived at by circulation shall be placed before the next meeting of the Board of Directors for their ratification. Should a difference of opinion arise in the course of such circulation, the matter shall not be decided by circulation but shall be placed before a meeting of the Board of Directors.

17. Should a member of the Board of Directors absent himself from four consecutive meetings of the Board, he shall cease to be a member of the Board of Directors but may be reinstated by the Board of Directors.

18. Subject to such resolutions as the Board of Directors may from time to time pass, the several officers of the society shall have the powers mentioned below :—

(*a*) The President shall have a general control over all the affairs of the society and shall ex-officio be the Treasurer and shall have the custody of all the properties of the society and he shall also have the power to appoint the members of the establishment as well as to fine, suspend or dismiss them subject in the last two cases to the approval of the Board of Directors and the Registrar.

(*b*) The Secretary shall be responsible for the executive administration of the society subject to the control of the President.

(*c*) The President shall be the officer to sue or be sued on behalf of the society and all bonds in favour of the society shall be in the name of the President.

(*d*) Should the Secretary require relief from work, it shall be competent to the President to grant such relief, making suitable arrangements for the conduct of work by one or more of the members of the Board of Directors.

19. Receipts shall be issued for all moneys paid to the society. For moneys paid by members the receipts shall be signed by the President or the Secretary whoever is selected by the Board of Directors to discharge this function.

20. It shall be the duty of the Board of Directors to maintain such accounts and registers as are prescribed by the rules under the Act and by the Registrar from time to time, to place before a general body meeting of the members the Registrar's notes of audit or inspection within one month from the date of receipt, to correspond with the Registrar and to do all other business relating to the society.

21. The Board of Directors shall have power to prescribe from time to time the scale of office establishment and to incur such expenditure, as may be necessary for the management of the society with reference to the scale and within the budget allotment sanctioned by the general body and approved by the Registrar for each year.

22. The Board of Directors shall be competent to fix the amount and nature of the security, if any, to be given by the office establishment.

23. It shall be competent to the Board of Directors to frame subsidiary by-laws for the conduct of the business of the society consistent with the Act, the rules under the Act, and these by-laws. Such subsidiary by-laws shall be entered in the minute book of the society and they shall be reported to the Registrar of Co-operative Societies for approval.

24. The services of the members of the Board of Directors shall be gratuitous.

General Body

25. The ultimate authority in all matters relating to the administration of the society shall be the general body of the members who shall meet from time to time and at least once a year to conduct the work of the society. The general body shall not interfere with the action of the Board of Directors in respect of matters delegated to it under the by-laws. The following among other matters shall be dealt with by the general body :—

(1) the election and removal of the Board of Directors ;

(2) the annual report due to the Registrar of Co-operative Societies ;

(3) the Registrar's annual audit certificate ;

(4) the amendment or repeal of any existing by-law or the enactment of a new by-law ;

(5) the expulsion of a member ;

(6) the consideration of any complaint which any individual member may prefer against the Board of Directors ;

(7) The returns that may be prescribed by the Local Government;

(8) the determination of the scale of fees or contributions levied under by-law 38 ;

(9) the selection and approval of a particular variety of cattle, cows or bulls to be maintained by the members of the society ; and

(10) the annual budget.

26. A meeting of the general body of the members may be convened, whenever necessary, for the conduct of the business by the Board of Directors and shall be convened by Board of Directors at the request of 15 or more members or at the instance of the Registrar or by a resolution of the governing body specially deputed by a resolution of the governing body of the union to which the society is affiliated.

27. It shall be the duty of every member to attend the meetings of the general body. The quorum for a general body meeting shall be or one-fourth of the total number of members on the list at the time, whichever is less.

28. The President, when present, shall preside at the meetings of the general body. In his absence the body may choose a chairman from their number to preside at the meeting. Every member shall have one and only one vote. All questions shall be decided by a majority of votes of the members present and voting. When votes are equal, the chairman of the meeting shall have a casting vote.

29. Three days' notice shall ordinarily be given to members before a meeting of the general body is convened.

30. If a member deceives the society in any way or if his general conduct is such as to render his removal necessary in the interests of the society, it shall be open to the general body to expel such a member. A member may be expelled for (1) refusal to maintain the particular varieties of animals approved by the Board of Directors ; (2) utilizing the services of an inferior stud bull ; (3) ill-treatment of animals; (4) breaking sanitary rules or refusing to carry out the sanitary orders of the Board of Directors or the Veterinary or Agricultural department, (5) any breach of the by-laws or subsidiary by-laws made by the Board of Directors. An expelled member shall be paid all moneys due to him from the society after deductiong therefrom any money due from him to the society. A member who drives the society to Court to recover the money due from him shall, for that reason, be expelled from membership. An expelled member shall be liable as provided in by-law 3 for the debt due by the society as from the date of expulsion for a period of two years after such expulsion.

31. The general body shall have authority to affiliate the society to any co-operative union (with suitable jurisdiction) that may be registered by the Registrar or that is working in the neighbourhood of the society. Towards the expenses of such union, the society shall contribute such sum as is fixed by the society with the approval of the union or supervising body and the Registrar provided that the total amount payable on this account in any one year shall not exceed Rs. 150.

32. The amount of paid-up share capital, deposit and any other money to the credit of a member or a past member shall be subject to a first charge in favour of the society in respect of any moneys due to the society from such member or past member. The society shall be at liberty to appropriate the whole or any portion of such paid-up share capital, deposit or any other money to the moneys due by the member to the society.

Business of the Society

33. *Cattle-breeding.*—It shall be competent for the Board of Directors—

(1) to purchase or obtain by a free grant either from Government or from others for breeding purposes one or more stud bulls approved by the Agricultural department and arrange for its or their upkeep either at the cost of the society or otherwise ;

(2) to select and mark animals either by branding or otherwise which the s ciety undertakes to have under its care and supervision ;

(3) to supervise the proper breeding, nourishment and grazing of the animals so placed in charge of the society ;

(4) to make arrangements for the grazing of the cattle under the care of the society if possible and keep them apart from other cattle ;

(5) to examine the cows and bulls half-yearly and weed out defective animals ;

(6) to arrange for veterinary aid in case of diseases and use preventive measures ;

(7) to watch that the animals are kept under clean and sanitary conditions and diseeased animals segregated or removed ;

(8) to watch for and guard against evasion of the duty of members to use only the approved stud bulls;

(9) to watch that a mature stud bull shall not be allowed to cover more than certain number of cows fixed by the Agricultural department; and

(10) to erect, purchase or rent sheds and godowns to facilitate the carrying out of the objects of the society.

34. When the society is in a position to provide a stud bull no member of the society shall allow his cows to be covered by any stud bull other than the one selected by the Board of Directors as approved by the Agricultural department. Any member committing a breach of this by-law shall pay to the society for each breach such sum not exceeding Rs. 5 as may be determined by the Board of Directors. An accidental covering not due to the fault of a member shall not involve a penalty.

35. Every member is bound to have all his male young stock castrated immediately after except stock kept for breeding purposes. The Board of Directors will on the advice of the Agricultural department decide as to the animals to be kept for breeding purposes. Any violation of this by-law shall make a member liable for each offence to a fine of such sum not exceeding Rs. 2 as may be decided by the Board of Directors.

36. Every member shall be bound to inform the Board of Directors at once of any case of sickness amongst his cattle and of any outbreak of contagious disease in the locality and to carry out the suggestions of the Board in regard to treatment, disinfection and segregation. Any omission to inform the Board of Directors of any sickness or any outbreak of contagious disease or any refusal or omission to carry out the suggestions made by the Board of Directors shall render the member liable to a fine not exceeding Rs. 5 for each offence. The Board of Directors must inform the Veterinary department as early as possible of any such sickness, or outbreak of contagious disease for such action as is necessary. A fine of Rs. 5 shall be levied from the members who refuse to have their animals inoculated when this is considered necessary by the Veterinary department.

Joint purchase and sale

37. It shall be competent to the Board of Directors to arrange for the joint purchase or joint sale of surplus cattle required or possessed by members. In arranging for such purchase or sale the Board of Directors shall act only as agent of members and shall not make the society liable for any loss.

38. The Board of Directors shall have power to levy fees or collect contributions from members on a scale approved of by the general body of members for—

(1) the purchase and upkeep of one or more breeding animals;

(2) the pasturing of the animals under the care and supervision of the society;

(3) service by the breeding animals of the society or other animals selected by the Board of Directors for the purpose;

(4) the joint purchase and sale of animals on behalf of members; and

(5) for any other purpose which the Board of Directors think necessary in order to achieve the objects of the society.

39. It shall be competent to the Board of Directors to borrow funds either from members or non-members or from the   District Bank, Ltd., provided that the amount so borrowed does not exceed five times the society's paid-up share capital plus reserve fund and provided also that the interest payable on the borrowed amount shall not in any case exceed 5½ per cent per annum.

Profits

40. (1) Twenty-five per cent of net profits of the society as declared by the Registrar every year shall be carried to the credit of the reserve fund.

(2) Out of the remainder, a sum equivalent to 12½ per cent of the net profits may be paid as honorarium to the Secretary.

(3) Out of the remainder, a sum not exceeding 7½ per cent of the net profits may be carried to the credit of common good fund to be utilized for any of the purposes specified in section 2 of the Charitable Endowments Act VI of 1890 (India), viz., sanitation.

(4) Any profits not allotted in the manner aforesaid in any year shall be forthwith added to the reserve fund.

All undisbursable and indivisable profits shall be added to the reserve fund.

Reserve Fund

41. (1) The reserve fund shall belong to the society as a whole and is intended to meet unforeseen losses. No member can claim a share in it. It shall be invested

in such manner as the Registrar of Co-operative Societies prescribes and shall not be drawn upon except with his sanction.

(2) On the dissolution of the society the reserve fund and other funds contributed by it under provisions of its by-law shall be applied—

(i) to discharge such liabilities of the society as may remain undischarged after the enforcement in full of liability of the members of the society; and

(ii) to the repayment of the share capital paid up.

(3) Such portion of these funds as shall remain after payments mentioned in sub-clause (ii) shall be applied to such local objects of public utility as may be selected by the general body and approved of by the Registrar. If within three months of the final closing up of the society the general body fails to make any selection that is approved of by the Registrar, the latter may use the above mentioned portion of the funds in supporting other co-operative societies in the neighbourhood and shall place the same on interest or otherwise with some co-operative bank until a new co-operative society with a similar area of operations is registered in which event the funds shall be credited to the reserve fund of such society.

42. If, however, at any time the general body resolves to split the society into more than one society by excluding a portion of the existing area of operations from the operations of the society and a new society or societies be registered to cover the area so excluded, a portion of the reserve fund shall be transferred to the society or societies as decided upon by the general body which resolves upon the splitting of the original society.

43. No amendment to, alteration in, or cancellation of a by-law nor the enactment of a new by-law shall be made except at a general body meeting of the members or shall take effect until it shall have been approved by the Registrar.

Miscellaneous

44. Should any doubt arise as to the construction of the Act or any by-law, the Board of Directors shall refer the same to the Registrar of Co-operative Societies for advice and act according to his advice.

45. The society shall prepare annually in such form as may be prescribed by the Registrar (*a*) a statement showing the receipts and disbursements for the year, (*b*) a profit and loss account, (*c*) a balance sheet and (*d*) such other statements as may be prescribed by the Registrar.

These statements shall be made up to 30th June and a copy of each shall be sent to the Registrar within fifteen days after the close of the co-operative year ending 30th June. After the Registrar has verified the statements and granted his audit certificate, the society shall publish such of the prescribed statements as he may direct in the manner prescribed by him.

46. If any dispute touching the business of the society (other than a dispute regarding disciplinary action taken by the society or its committee against a paid servant of the society) arises—

(*a*) among members, past members and persons claiming through members, past members and deceased members, or

(*b*) between a member, past member, or person claiming through a member, past member, or deceased member and the society, its committee or any officer, agent or servant of the society, or

(*c*) between the society or its committee and any past committee, any officer, agent or past servant or the nominee, heirs or legal representative of any deceased officer, deceased agent or deceased servant of the society, or

(*d*) between the society and any other registered society,

such dispute shall be referred to the Registrar for decision.

The Registrar may, on receipt of such reference—

(i) decide the dispute himself, or

(ii) transfer it for disposal to any person who has been invested by the Local Government with powers on that behalf, or

(iii) refer it for disposal to an arbitrator or arbitrators. The decision or award of the Registrar or the person to whom the reference was transferred or by the arbitrator or arbitrators to whom it was referred shall be final, subject to the provision of sub-section (5) of section 51 of the Co-operative Societies Act.

The decision or award of the Registrar or of the arbitrator or arbitrators as the case may be, shall be final and it may be enforced in either of these ways:—

(*a*) By an application made to the Collector of the district through the Registrar of Co-operative Societies requesting that the amount due under the decision or award may be recovered in the same manner as arrears of land revenue, or

(*b*) by an application to the Civil Court having jurisdiction over the subject-matter of the decision or award requesting that the court may enforce the division or award as if it were a decree of the court, or

(*c*) by an application to the Registrar of the district under section 57-A of the Madras Co-operative Societies Act VI of 1932.

47. Should any sum belonging to the society be either stolen or otherwise lost and found irrecoverable, it shall be open to the general body to write off such amounts after obtaining the sanction of the union to which the society is affiliated or the Registrar in case the society is not affiliated to any union.

Statement of areas under different heads in fasli 1352 *in the Ongole taluk*

Name of the village.	Cultivation of patta lands.		Cultivation of assessed and unassessed.		Cultivation of porambokes.	Waste lands.	
	Dry.	Wet.	Dry.	Wet.		Dry.	Wet.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ACS.	ACS.	ACS.		ACS.	ACS.	ACS.
86. Pernamitta ..	2,295·97	86·04	0·10	..	1·58	634·12	10·36
Myanampad	2,912·82	98·26	..	..	1·68	285·62	5·28
Santanutalapad ..	4,411·97	122·57	0·15	..	1·17	822·54	90·58
Bandalamudi	646·59	5·90	9·05	..	1·61	273·39	..
Kanduruvari Agraharam.	36·76	..	..	..	..	..	..
Chimakurthi	2,381·81	188·42	16·06	..	2·66	1,670·46	15·17
Rajupalem Lakshipuram.	57·84	..	..	..	..	..	..
Yenikapad	583·91	42·17	..	..	3·20	372·27	2·34
Maddulur	1,321·29	68·57	..	..	15·83	2,039·39	3·48
Pondur	1,971·04	..	..	..	15·14	210·61	..
Konijed	2,950·08	110·35	1·69	..	16·24	776·83	40·55
Ongole	654·87	..	..	..	17·84	386·08	..
Allur Kottapatnam ..	2,338·44	795·98	176·06	..	27·62	2,959·54	164·62
Tangutur	5,954·50	..	2·21	..	14·86	958·58	..
Alur	1,808·22	..	12·89	..	0·47	109·18	..
Karavadi	3,385·19	..	..	..	23·53	213·58	..
Devarampad	1,400·19	..	4·58	..	3·04	357·44	..
Ammanabrole	2,922·19	134·50	..	..	15·81	695·77	9·44
Kanuparthi	2,792·03	56·45	115·39	..	49·98	1,617·10	5·11
Raparla	1,073·19	90·65	0·37	..	1·65	131·50	5·11
Dalvalaravur	1,729·67	..	..	..	0·21	543·97	..
Pamidipad (Z) ..	..	..	..	..	..	..	..
Ravinutala	4,334·70	..	..	..	1·78	643·11	..
Korisapad	1,129·98	73·44	..	..	0·40	277·35	0·57
Chandalur	3,049·68	..	..	..	7·42	994·70	..
Pangulur	2,151·05	..	1·60	..	3·28	1,093·7	..
Addanki (North) ..	3,120·34	57·67	5·08	..	4·42	1,651·82	90·60
Addanki (South) ..	3,949·09	..	1·27	..	4·28	9,85.25	..
Ramayapalem	2,438·38	..	..	..	20·76	1,02·25	..

B. Government Scheme

1. (*a*) *Statement showing the progress of development work with one breeding bull*

Year. (1)	Number of breeding bulls. (2)	Deduct for loss by death, etc. (3)	Net number available for service. (4)	Number of cows required. (5)	Number of successful services at 50 per breeding bull. (6)	Bull calves. (7)	Female stock. (8)	25 per cent of column (7) considered fit for breeding. (9)
1	1	..	1 ..	55 to be purchased—Government cows.	50	25	25 (b)	6 (d)
2	1	..	1 ..	55 Do.	50	25	25 (e)	6 (g)
3	1	..	1 ..	55 of first year—Government cows.	50	25	25 (f)	6 (h)
4	1 plus 1 new ..	..	2 (c).	55 of second year—Government cows.	100	50	50 (i)	12 (k)
				25 at (b) Government cows.				
				30 new purchases—Government cows.				
				110				
5	2 at (c) plus ..	1	7 (j).	55 of first year—Government cows.	350	175	175 (m)	45 (l)
	6 at (d).			25 at (e)—Government cows.	* (70	35	35	9) *
	8			305 of ryots in breeding areas.				
				385				
6	7 at (j) plus. ..	1	12 (n).	55 of second year—Government cows.	60	300	300 (o)	75 (p)
	6 at (g).			25 at (b)—Government cows.	* (120	60	60	15) *
	13			25 at (f)—Government cows.				
				30 new purchases of fourth year.				
				525 of ryots in breeding areas.				
				660				
7	12 at (n) plus . ..	1	17 (q).	25 at (e)—Government cows ..	850	425	425 (r)	105 (s)
	6 at (h).			50 at (i)—Government cows ..	* (70	35	35	9) *
	18			305 private cows of fifth year ..				
				555 new cows of ryots in breeding area.				
				935				

8	17 at (q) plus .. 12 at (k) ..	2	27 (t).	25 at (b)—Government cows .. 25 at (f)—Government cows .. 30 new purchases of fourth year. 35 at (m) purchases of fourth year. 140 of column (8) purchased in sixth year. 525 purchased cows of sixth year. 705 new cows of ryots in breeding areas. ——— 1,485	1,350 * (240	675 120	675 (u) 120	170 (v) 30) *
9	27 at (t) plus .. 9 at (1) plus .. 36 purchased in sixth year. ——— 72	7	65 (w)	25 at (e)—Government cows .. 60 at (o)—Government cows .. 50 at (i)—Government cows .. 240 purchased in seventh year—Government cows. 305 purchased cows of fifth year. 555 purchased cows of seventh year. 2,340 new cows of ryots in breeding areas. ——— 3,575	3,250 * (350	1,625 175	1,625 (x) 175	400 (y) 45) *
10	65 at (w) plus. 15 at (p) plus. 60 purchased in seventh year. ——— 140	15	125 (z)	25 at (f)—Government cows .. 35 at (m)—Government cows .. 35 at (r)—Government cows .. 390 purchases of eighth year—Government cows. 525 purchased cows of sixth year. 705 purchased cows of eighth year. 5,160 new private cows in breeding area. ——— 6,875	6,250 * (450	3,125 225	3,125 (bb) 225	780 (ff) 56) *

NOTE.—There will be about 2,500 breeding bulls available for service at the beginning of the fifteenth year.
* Government stock.

1. *(a) Statement showing the progress of development work with one breeding bull*—cont.

Year.	Number of breeding bulls.	*Deduct* for loss by death, etc.	Net number available for service.	Number of cows required.	Number of successful services at 50 per breeding bull.	Bull calves.	Female stock.	25 per cent of column (7) considered fit for breeding.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11	125 at (z) plus ..	20	210 (aa).	50 at (i)—Government cows ..	10,500	5,250	5,250 (cc)	1,310(gg)
	2 at (s) plus ..			60 at (o)—Government cows ..	* (700	350	350	90) *
	96 purchases of eighth year.			120 at (w)—Government cows ..				
				555 purchases of ninth year—Government cows.				
	230			555 private cows of seventh year.				
				2,340 private cows of ninth year.				
				7,870 new private cows.				
				11,550				
12	210 at (aa) plus ..	30	350 (dd).	35 at (m)—Government cows ..	17,500	8,750	8,750 (ee)	2,200 (hh)
	30 at (v) plus ..			35 at (r)—Government cows ..	* (1,500	750	750	200) *
	140 purchased in ninth year.			175 at (x)—Government cows ..				
				1,450 purchases of tenth year—Government cows.				
	380			705 private cows of eighth year.				
				5,160 private cows of tenth year.				
				11,690 new private cows.				
				19,250				
13	350 at (dd) plus ..	50	700 (ii).	60 at (o)—Government cows ..	35,000	17,500	17,500 (kk)	4,375
	45 at (y) plus ..			120 at (u)—Government cows ..	* (3,000	1,500	1,500	375)*
	355 purchases of tenth year.			225 at (bb)—Government cows ..				
	750			2,900 purchases of eleventh year—Government cows.				

				2,340 private cows of ninth year. 7,870 private cows of eleventh year. 24,985 new private cows. 38,500				
14	700 at (ii) plus .. .. 56 at (ff). .. .. 724 purchases of eleventh year. 1,480	80	* 1,400 (jj).	35 at (r) —Government cows .. 175 at (x)—Government cows • 350 at (cc)—Government cows. 4,900 purchases of twelfth year—Government cows. 5,160 private cows of tenth year. 11,690 private cows of twelfth year. 54,690 new cows—private. 77,000	70,000 * (5,000	35,000 2,500	35,000 2,500	8,750 625) *
15	1,400 at (jj) plus .. 90 at (gg) plus .. 1,220 purchases of twelfth year. 2,710	210	2,500.					

NOTE.—There will be about 2,500 breeding bulls available for service at the beginning of the fifteenth year.
* Government stock.

(b) *Purchases*

Year.	Breeding bulls.		Cows.		Work animals.		Total of columns (3), (5) and (7).
	Number.	Cost at Rs. 350 each.	Number.	Cost at Rs. 350 each.	Number.	Cost at Rs. 250 each.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		RS.		RS.		RS.	RS.
1st	1	350	55	19,250	10	2,500	22,100
2nd	..	..	55	19,250	10	2,500	21,750
3rd	..	..	..	..	10	2,500	2,500
4th	1	350	30	10,500	..	..	10,850
5th	..	..	..	..	1	250	250
6th	..	..	..	..	1	250	250
7th	..	..	..	..	..	..	..
8th	..	..	..	..	24	6,000	6,000
9th	..	..	..	..	25	6,250	6,250
10th	..	..	..	..	74	18,500	18,500
11th	..	..	..	..	60	15,000	15,000
12th	..	..	..	..	120	30,000	30,000
13th	..	..	..	..	131	32,750	32,750
14th	..	..	..	..	340	85,000	85,000
Total ..		700		49,000		2,01,500	2,51,200

The bull calves born on the farm but considered unfit for breeding purposes will be castrated and used as work animals from their fourth year. Column (6) shows the number of other animals required for work and to be purchased.

(c) *Maintenance charges*

Year.	Breeding bulls.		Cows.		Work bullocks.		Calves. Heifers.		Calves. Bull calves.		Premia for maintenance.		Total of columns (3), (5), (7), (9), (11) and (13).
	Number.	Amount at Rs. 729 each.	Number.	Amount at Rs. 430 each.	Number.	Amount at Rs. 200 each.	Number.	Amount at Rs. 300 each.	Number.	Amount at Rs. 300 each.	Number.	Amount at Rs. 160 each.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
		RS.		RS.		RS.		RS.		RS.		RS.	RS.
1st	1	720	55	23,100	10	2,000	15	4,500	15	4,500	..	..	34,820
2nd	1	720	110	46,200	10	2,000	40	12,000	21	6,300	..	..	67,220
3rd	1	720	110	46,200	10	2,000	65	19,500	27	8,100	..	..	76,520
4th	2	1,440	165	69,300	16	3,200	80	24,000	48	14,400	..	..	1,12,340
5th	7	5,040	190	79,800	20	4,000	100	30,000	49	14,700	305	48,800	1,82,340
6th	12	8,640	160	67,200	20	4,000	300	90,000	73	21,900	525	84,000	2,75,740
7th	17	12,240	155	65,100	30	6,000	420	1,26,000	157	47,100	860	1,37,600	3,94,040
8th	27	19,440	295	1,23,900	50	10,000	825	2,47,500	245	73,500	1,230	1,96,800	6,71,140
9th	65	46,800	435	1,82,700	70	14,000	1,200	3,60,000	450	1,35,000	3,200	5,12,000	12,50,500
10th	125	90,000	595	2,49,900	100	20,000	2,435	7,30,500	710	2,13,000	6,390	10,22,400	23,25,800
11th	210	1,51,200	855	3,59,100	150	30,000	4,960	14,88,000	1,433	4,29,900	10,765	17,22,400	41,80,600
12th	350	2,52,000	1,925	8,08,500	250	50,000	8,825	26,47,500	2,940	8,82,900	16,850	26,96,000	73,36,000
13th	700	5,04,000	3,515	14,76,300	300	60,000	14,900	44,70,000	4,515	13,54,500	35,195	5 6,31,200	1,34,96,000
14th	1,400	10,08,000	5,805	24,38,100	600	1,20,000	29,250	87,75,000	8,460	25,38,000	71,540	1,14,46,400	2,63,25,500
Total ..		21,00,960		60,35,400		3,27,200		1,90,24,500		57,42,900		2,35,97,600	5,67,28,560

(d) Receipts

Year (360 days).	Number of cows in milk.	By sale of milk.		By sale of old bulls.		By sale of old cows.		By sale of heifers purchased from ryots.		Total of columns (4), (6), (8) and (10).
		Total quantity at 10 lb. per cow per day.	Total amount at As. 3 per lb.	Number.	At Rs. 20 each.	Number.	At Rs. 20 each.	Number.	At Rs. 150 each with calf.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		LB.	RS.		RS.		RS.		RS.	RS.
1st ..	20	72,000	13,500	..	..	..	..	..	..	13,500
2nd ..	50	180,000	33,750	..	..	..	..	..	..	33,750
3rd ..	50	180,000	33,750	..	..	..	..	..	..	33,750
4th ..	80	288,000	54,000	..	..	..	..	..	..	54,000
5th ..	120	432,000	81,000	..	..	..	..	..	..	81,000
6th ..	90	324,000	60,750	1	20	55	1,100	..	..	61,870
7th ..	80	288,000	54,000	..	..	55	1,100	..	..	55,100
8th ..	140	504,000	94,500	..	..	..	..	..	..	94,500
9th ..	200	720,000	1,35,000	4	80	55	1,100	140	21,000	1,57,180
10th ..	300	1,080,000	2,02,500	10	200	25	500	240	36,000	2,39,200
11th ..	400	1,440,000	2,70,000	15	300	25	500	390	58,500	3,29,300
12th ..	1,000	3,600,000	6,75,000	20	400	50	1,000	555	83,250	7,59,650
13th ..	1,500	5,400,000	10,12,500	35	700	35	700	1,450	2,17,500	12,31,400
14th ..	2,500	9,000,000	16,87,500	55	1,100	60	1,200	2,900	4,35,000	21,24,800
		Total ..	44,07,750		2,800		7,200		8,51,250	52,69,000

The figures in column (2) are averages for the year as a whole.

2. *Staff required*

I. Superior

Designation.	Number required in each year.													
	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	12)	(13)	(14)	(15)
Direction	1	1	1	1	1	1	1	1	1	2	2	2	3	4
Farm Manager	1	1	1	1	2	2	3	4	6	10	15	25	30	60
Assistant Farm Manager	..	..	..	..	..	..	..	1	2	5	15	25	30	60
Stockmen and fieldmen (one for every 50 animals).	2	3	4	6	7	9	15	28	43	77	150	280	472	890
Recorder (two for each farm)	2	2	2	2	4	4	6	8	12	20	30	50	60	120
Head clerk	1	1	1	1	1	1	1	1	1	2	2	2	3	4
Routine clerk (one for Directing Officer and one for farm)	2	2	2	2	3	3	4	5	7	12	17	27	33	64
Accountant (one for direction only)	1	1	1	1	1	1	1	1	1	2	2	2	3	4
Peons (one for office, one for Farm Manager and one for office)	3	3	3	3	4	4	5	6	8	14	19	29	36	68
Number of farms	1	1	1	1	2	2	3	4	6	10	15	25	30	60

II. Menial staff payable from contingencies

Maistris (one for every nine cattlemen)	..	..	..	..	..	1	2	4	5	8	16	31	52	99
Cattlemen (Rs. 20 each) (one for every fifty animals).	2	3	4	6	7	9	15	28	43	77	150	280	472	890
Milkmen (Rs. 25 each) (one for every twenty-five cows)	1	2	2	3	4	4	4	5	8	12	17	35	60	120
Breeding bull attendant (at Rs. 20 per mensem) (one for every two bulls)	1	1	1	1	3	6	8	14	32	62	105	175	350	700
Night watchmen (Rs. 12 each)	1	1	1	1	2	2	3	4	6	10	15	25	30	60
Calf boys (Rs. 8 each) (one for every twenty-five calves)	1	2	4	5	6	15	23	43	50	125	256	470	760	1,500

3. *Buildings required each year*

Designation. (1)	Cost of each building. (2) RS.	1st. (3) RS.	2nd. (4) RS.	3rd. (5) RS.	4th. (6) RS.	5th. (7) RS.	6th. (8) RS.	7th. (9) RS.	8th. (10) RS.
I. Official									
	10,000 for each farm.	10,000	..	..	..	10,000	..	10,000	10,000
II. Residential									
Direction	..	..	..	..	..	..	..	..	..
Farm Manager	4,000	4,000	..	..	..	4,000	..	4,000	4,000
Assistant Farm Manager	3,000	..	..	..	..	..	..	..	3,000
Fieldmen	1,000	2,000	1,000	1,000	2,000	1,000	2,000	6,000	13,000
Recorders	2,500	5,000	..	..	..	5,000	..	5,000	5,000
Routine clerk	2,500	2,500	..	..	..	2,500	..	2,500	2,500
Peons	800	800	..	..	..	800	..	800	800
Total ..	..	14,300	1,000	1,000	2,000	13,300	2,000	18,300	28,300
Grand total ..	..	24,300	1,000	1,000	2,000	23,300	2,000	28,300	38,300
Cost of maintenance at 1½ per cent	..	150	150	150	150	300	300	450	60

Designation. (1)	9th. (11) RS.	10th. (12) RS.	11th. (13) RS.	12th. (14) RS.	13th. (15) RS.	14th. (16) RS.	Total. (17) RS.
I. Official—*cont.*							
	20,000	40,000	50,000	1,00,000	50,000	3,00,000	6,00,000
II. Residential—*cont.*							
Direction	..	..	..	..	..	..	..
Farm Manager	8,000	16,000	20,000	40,000	20,000	1,20,000	2,40,000
Assistant Farm Manager	3,000	9,000	30,000	30,000	15,000	90,000	1,80,000
Fieldmen	15,000	34,000	73,000	1,30,000	1,92,000	4,18,000	8,90,000
Recorders	10,000	20,000	25,000	50,000	25,000	1,50,000	3,00,000
Routine clerk	5,000	10,000	12,500	22,500	15,000	75,000	1,50,000
Peons	1,600	3,200	4,000	8,000	4,000	24,000	48,000
Total ..	42,600	92,200	1,64,500	2,80,500	2,71,000	8,77,000	18,08,000
Grand total ..	62,600	1,32,200	2,14,500	3,80,500	3,21,000	11,77,000	24,08,000
Cost of maintenance at 1½ per cent	900	1,500	2,250	3,750	4,500	9,000	24,150

4. Pay of staff

I. Superior staff

Designation. (1)	First year. (2)	Second year. (3)	Third year. (4)	Fourth year. (5)	Fifth year. (6)	Sixth year. (7)	Seventh year. (8)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Special Officers on Rs. 200—30/2—260—40/2—700 ..	2,400	2,400	2,760	2,760	3,120	3,120	3,600
Farm Managers on Rs. 155—15/2—200	1,860	1,860	2,040	2,040	4,080	4,080	6,300
Assistant Farm Managers on Rs. 75—7½/2—105—15/2—150.	..	..	..	..	..	..	..
Stockmen on Rs. 28—1/2—40	672	1,008	1,368	2,052	2,424	3,132	5,196
Recorders on Rs. 30—3/2—45—2/2—55	720	720	792	792	1,584	1,584	2,448
Head clerks on Rs. 70—5/2—85—7½/2—100	840	840	900	900	960	960	1,020
Routine clerks on Rs. 30—3/2—45—2/2—55	720	720	792	792	1,224	1,224	1,692
Accountants on Rs. 55—5/2—70	660	660	720	720	780	780	840
Peons on Rs. 12—17 scale—							
First 4 years 12							
Next 4 years 13							
Next 5 years 14	432	432	432	432	612	612	756
Next 6 years 15							
Next 6 years 16							
25 years and above 17							
Total ..	8,304	8,640	9,804	10,488	14,784	15,492	21,852

Designation. (1)	Eighth year. (9)	Ninth year. (10)	Tenth year. (11)	Eleventh year. (12)	Twelfth year. (13)	Thirteenth year. (14)	Fourteenth year. (15)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Special Officers on Rs. 200—30/2—260—40/2—700 ..	3,600	4,080	6,480	6,960	7,320	10,200	12,960
Farm Managers on Rs. 155—15/2—200	8,160	12,240	19,860	29,880	49,380	60,120	1,18,620
Assistant Farm Managers on Rs. 75—7½/2—105—15/2—150.	900	1,800	3,590	13,680	23,040	28,530	56,790
Stockmen on Rs. 28—1/2—40	9,624	14,784	26,424	51,252	95,556	1,61,244	3,03,876
Recorders on Rs. 30—3/2—45—2/2—55	3,168	4,824	7,776	11,736	19,296	23,616	46,296
Head clerks on Rs. 70—5/2—85—7½/2—100	1,020	1,110	1,950	2,040	2,100	2,940	3,840
Routine clerks on Rs. 30—3/2—45—2/2—55	2,052	2,916	4,752	6,768	10,584	13,116	24,852
Accountants on Rs. 55—5/2—70	840	840	1,500	1,500	1,560	2,220	2,880
Peons on Rs. 12—17 scale—							
First 4 years 12							
Next 4 years 13							
Next 5 years 14	900	1,236	2,100	2,820	4,284	5,328	10,044
Next 6 years 15							
Next 6 years 16							
25 years and above 17							
Total ..	30,264	43,830	74,432	1,26,636	2,13,120	3,07,314	5,80,158

II. Pay of menial staff

Designation. (1)	First year. (2)	Second year. (3)	Third year. (4)	Fourth year. (5)	Fifth year. (6)	Sixth year (7)	Seventh year. (8)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Maistris on Rs. 22 per mensem ..	..	..	..	..	..	264	528
Cattlemen on Rs. 20 per mensem ..	480	720	960	1,440	1,680	2,160	3,600
Milkmen on Rs. 25 per mensem ..	300	600	600	900	1,200	1,200	1,200
Breeding bull attendants on Rs. 20 per mensem ..	240	240	240	240	720	1,440	1,920
Night watchmen on Rs. 12 per mensem ..	144	144	144	144	288	288	432
Calf boys on Rs. 8 per mensem ..	96	192	384	480	576	1,440	2,208
Total pay of menial staff ..	1,260	1,896	2,328	3,204	4,464	6,792	9,888
Total pay of superior staff ..	8,304	8,640	9,804	10,488	14,784	15,492	21,852
Total pay ..	9,564	10,536	12,132	13,692	19,248	22,284	31,740
Travelling allowance of superior staff at 25 per cent roughly.	2,076	2,160	2,451	2,622	3,646	3,873	5,463
Dearness allowance at 16-2/3 per cent of the total ..	1,594	1,756	2,022	2,282	3,208	3,714	5,290
Total allowances ..	3,670	3,916	4,473	4,904	6,854	7,587	10,75
Grand total ..	13,234	14,452	16,605	18,596	26,102	29,871	42,493

Designation. (1)	Eighth year. (9)	Ninth year. (10)	Tenth year. (11)	Eleventh year. (12)	Twelfth year. (13)	Thirteenth year. (14)	Fourteenth year. (15)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Maistris on Rs. 22 per mensem ..	1,056	1,320	2,112	4,224	8,184	13,728	26,136
Cattlemen on Rs. 20 per mensem ..	6,720	10,320	18,480	36,000	67,200	1,13,280	2,13,600
Milkmen on Rs. 25 per mensem ..	1,500	2,400	3,600	5,100	10,500	18,000	36,000
Breeding bull attendants on Rs. 20 per mensem ..	3,360	7,680	14,880	25,200	42,000	84,000	1,68,000
Night watchmen on Rs. 12 per mensem ..	576	864	1,440	2,160	3,600	4,320	8,640
Calf boys on Rs. 8 per mensem ..	4,128	4,800	12,000	24,576	45,120	72,960	1,44,000
Total pay of menial staff ..	17,340	27,384	52,512	97,260	1,76,604	3,06,288	5,96,376
Total pay of superior staff ..	30,264	43,830	74,432	1,26,636	2,13,120	3,07,314	5,80,158
Total pay ..	47,604	71,214	1,36,944	2,23,896	3,89,724	6,13,602	11,76,534
Travelling allowance of superior staff at 25 per cent roughly.	7,566	10,958	18,608	31,659	53,280	76,828	1,45,040
Dearness allowance at 16-2/3 per cent of the total ..	7,934	11,869	22,824	37,316	64,954	1,02,267	1,96,089
Total allowances ..	15,500	22,827	41,432	68,975	1,18,234	1,79,095	3,41,129
Grand total ..	63,104	94,041	1,78,376	2,92,871	5,07,958	7,92,697	15,17,653

5. *Financial results*

Year.	Non-recurring or recurring.	Land.	Buildings.	Equipment.	Staff.	Livestock.	Contingencies.	Total of columns (3) to (8).	Deduction of receipts.	Not expenditure.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1st ..	Non-recurring	3,500	24,300	4,600	..	22,100	..	54,500	..	..
	Recurring	4,000	150	1,400	13,234	34,820	2,000	55,604	13,500	42,104
2nd ..	Non-recurring	..	1,000	..	..	21,750	• ..	22,750	..	..
	Recurring	4,000	150	1,400	14,452	67,220	2,000	89,222	33,750	55,472
3rd ..	Non-recurring	..	1,000	..	..	2,500	..	3,500	..	..
	Recurring	4,000	150	1,400	16,605	76,520	2,000	1,00,675	33,750	66,925
4th ..	Non-recurring	..	2,000	..	..	10,850	..	12,850	..	..
	Recurring	4,000	150	1,400	18,596	1,12,340	2,000	1,38,486	54,000	84,486
5th ..	Non-recurring	3,500	23,300	4,600	..	250	..	31,650	..	..
	Recurring	8,000	300	2,800	26,102	1,82,340	4,000	2,23,542	81,000	1,42,542
6th ..	Non-recurring	..	2,000	..	..	250	..	2,250	..	..
	Recurring	8,000	300	2,800	29,871	2,75,740	4,000	3,20,711	61,870	2,58,841
7th ..	Non-recurring	3,500	28,300	4,600	..	..	..	36,400	..	..
	Recurring	12,000	450	4,200	42,494	3,94,040	6,000	4,59,183	55,100	4,04,083
8th ..	Non-recurring	3,500	38,300	4,600	..	6,000	..	52,400	..	..
	Recurring	16,000	600	5,600	63,104	6,71,140	8,000	7,64,444	94,500	6,69,944
9th ..	Non-recurring	7,000	62,600	9,200	..	6,250	..	85,050	..	..
	Recurring	24,000	900	8,400	94,041	12,50,500	12,000	13,89,841	1,57,180	12,32,661
10th ..	Non-recurring	14,000	1,32,200	18,400	..	18,500	..	1,83,100	..	..
	Recurring	40,000	1,500	14,000	1,78,376	23,25,800	20,000	25,79,676	2,39,200	23,40,476
11th ..	Non-recurring	17,500	2,14,500	23,000	..	15,000	..	27,000	..	..
	Recurring	60,000	2,250	21,000	2,92,871	41,80,600	30,000	45,86,721	3,29,300	42,57,421
12th ..	Non-recurring	35,000	3,80,500	46,000	..	30,000	..	4,91,500	..	..
	Recurring	1,00,000	3,750	35,000	5,07,958	73,36,000	50,000	80,32,708	7,59,650	72,73,058
13th ..	Non-recurring	17,500	3,21,000	23,000	..	32,750	..	3,94,250	..	..
	Recurring	1,20,000	4,500	42,000	7,92,697	1,34,96,000	60,000	1,45,15,197	12,31,400	1,32,83,797
14th ..	Non-recurring	1,05,000	11,77,000	1,38,000	..	85,000	..	15,05,000	..	..
	Recurring	2,40,000	9,000	84,000	15,17,653	2,63,25,500	1,20,000	2,82,96,153	21,24,800	2,61,71,353
Total ..	Non-recurring	2,10,000	24,08,000	2,76,000	..	2,51,200	..	31,45,200	..	31,45,200
	Recurring	6,44,000	24,150	2,25,400	36,08,053	5,67,28,560	3,22,000	6,15,52,163	52,69,000	5,62,83,163*

* For scheme starting with one bull and Rs. 16,88,49,489 for scheme with three bulls.

C. Combined Scheme

1. *Staff required for the supervision of Breeders' work*

Year.	Number of breeders.	Officer.	Inspector.	Head clerk.	Routine clerk (1 for officer and 1 for Inspector).	Accountant.	Peons (2 for officer, 1 for Inspector, and 1 for office).	Stock men.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2nd ..	10	1	1	1	2	1	4	1
3rd ..	25	1	3	1	4	1	6	1
4th ..	50	1	6	1	7	1	9	2
5th ..	100	2	12	2	14	2	18	2
6th ..	130	2	16	2	18	2	22	3
7th ..	160	3	20	3	23	3	29	10
8th ..	200	3	25	3	28	3	34	20

2. (*a*) *Grant for purchase of breeding bulls*

Year.	Breeding bulls. Number.	Breeding bulls. Cost at Rs. 350 each.	Year.	Breeding bulls. Number.	Breeding bulls. Cost at Rs. 350 each.
		RS.			RS.
2nd	20	7,000	7th	320	1,12,000
3rd	50	17,500	8th	400	1,40,000
4th	100	35,000			
5th	200	70,000	Total ..	1,350	4,72,500
6th	260	91,000			

(*b*) *Grant towards maintenance of animals by breeders*

Year.	Number of animals. Breeding bulls.	Heifers.	Bull calves.	Total.	Cost of maintenance at Rs. 200 per animal on the average.
(1)	(2)	(3)	(4)	(5)	(6)
					RS.
2nd	20	250	100	370	74,000
3rd	50	625	250	925	1,85,000
4th	100	1,250	500	1,850	3,70,000
5th	200	2,500	1,000	3,700	7,40,000
6th	260	3,250	1,300	4,810	9,62,000
7th	320	4,000	1,600	5,920	11,84,000
8th	400	5,000	2,000	7,400	14,80,000
Total ..	1,350	16,875	6,750	24,975	49,95,000

(*c*) *Advance towards purchase of animals*

Year.	Heifers. Numbers.	Heifers. Cost at Rs. 50 each.	Bull calves. Numbers.	Bull calves. Cost at Rs. 100 each.	Total of columns (3) and (5).
(1)	(2)	(3)	(4)	(5)	(6)
		RS.		RS.	RS.
2nd	250	12,500	100	10,000	22,500
3rd	625	31,250	250	25,000	56,250
4th	1,250	62,500	500	50,000	1,12,500
5th	2,500	1,25,000	1,000	1,00,000	2,25,000
6th	3,250	1,62,500	1,300	1,30,000	2,92,500
7th	4,000	2,00,000	1,600	1,60,000	3,60,000
8th	5,000	2,50,000	2,000	2,00,000	4,50,000
Total ..	16,875	8,43,750	6,750	6,75,000	15,18,750

(*d*) *Total expenditure on account of breeders*

Year.	Grant for Bulls.	Grant for Maintenance.	Advance (recoverable in third year).	Total.
(1)	(2)	(3)	(4)	(5)
	RS.	RS.	RS.	RS.
2nd	7,000	74,000	22,500	1,03,500
3rd	17,500	1,85,000	56,250	2,58,750
4th	35,000	3,70,000	1,12,500	5,17,500
5th	70,000	7,40,000	2,25,000	10,35,000
6th	91,000	9,62,000	2,92,500	13,45,500
7th	1,12,000	11,84,000	3,60,000	16,56,000
8th	1,40,000	14,80,000	4,50,000	20,70,000
Total ..	4,72,500	49,95,000	15,18,750	69,86,250

3. *Result of work by professional breeders*

Year of scheme.	Number of breeding bulls with breeders.	Number of bull calves becoming fit for breeding.	Total of columns (2) and (3).	Deduct for casualties of every kind.	Net available for service.	Number of calves at 50 per breeding bull.	Number of calves. Male.	Number of calves. Female.	25 per cent of column (8) considered fit for breeding.	Number of work animals produced each year.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2nd ..	20	..	20	..	20	1,000	500	500	125(*a*)	..	
3rd ..	50	..	50	5	45	2,250	1,125	1,125	280(*b*)	..	
4th ..	100	..	100	10	90	4,500	2,250	2,250	560(*c*)	375	Difference between columns (8) and (10) of one year.
5th ..	200 plus	125 at (*a*) 100 (1).	425	65	360	18,000	9,000	9,000	2,250(*d*)	845	
6th ..	260 plus	280 at (*b*) 250 (2).	790	130	660	33,000	16,500	16,500	4,200	1,690	20 breeding bulls of first year to be replaced.
7th ..	320 plus	560 at (*c*) 500 (3).	1,380	180	1,200	60,000	30,000	30,000	7,500	6,750	50 breeding bulls of second year to be replaced.
8th ..	400 plus	2,250 at (*d*) 1,000 (4).	3,290	290	3,000	1,50,000	75,000	75,000	18,750	12,300	100 breeding bulls of third year to be replaced.

Note.—(1) to (4) in column (3) are bull calves purchased by the breeders with the aid of Government grant in the second to fifth year of the scheme.

4. (*a*) *Cost of supervision staff*

Designation, number and scale of pay.	Ultimate cost.		Cost for eleven months in first year.	
	RS.	RS.	RS.	RS.
I. (*a*) *Pay*—				
1 Special Officers—Three on Rs. 200—700 (Average Rs. 350)	12,600		2,200	
2 Inspectors—Twenty-five on Rs. 155—15/2—200 (Average 184)	55,200		1,705	
3 Head clerks—Three—on Rs. 70—100 (Average Rs. 89½)	3,222		770	
4 Routine clerks—Twenty-eight on Rs. 30—55 (Average Rs. 42-1-0)	14,133		660	
5 Accountants—Three on Rs. 55—70 (Average Rs. 65¾)	2,367		605	
6 Peons—Thirty-four at Rs. 12—17 (Average Rs. 14-11-0) ..	5,992		528	
7 Stockmen—Twenty at Rs. 28—40 (Average Rs. 33-1/3)	8,000	1,01,514	308	6,776
(*b*) Travelling allowance at 25 per cent roughly		25,378		1,694
(*c*) Dearness allowance at 16-2/3 per cent roughly		16,919		1,129
Total pay and allowances		1,43,811		9,601
II. Rent for office	9,000	9,000	2,750	2,750
III. Furniture (Rs. 500 per annum) and books (Rs. 50 per annum) ..	550	550	350	350
IV. Contingencies at Rs. 1,000 for each officer per annum	3,000	3,000	910	910
Total ..		3,00,172		23,210
or in round figures ..		3,00,000		23,000
Add for increase of dearness allowance, etc.		10,000		1,000
		3,10,000		24,000

(b) Cost of staff at farm

—	Ultimate cost.	Eleven months in first year.
	RS.	RS.
A. Superior staff		
I. Pay—		
(1) 6 Farm Managers on Rs. 155—15/2—200 (average Rs. 184).	13,248	1,705
(2) 6 Routine clerks on Rs. 30—55 (average Rs. 42–1–0) ..	3,029	330
(3) 6 Dairy clerks on Rs. 30—55 (average Rs. 42–1–0) ..	3,029	330
(4) 12 Recorders on Rs. 30—55 (average Rs. 42–1–0) ..	6,058	660
(5) 12 Fieldmen on Rs. 28—1/2—40 (Rs. 33–1/3) ..	4,800	616
(6) 6 Peons on Rs. 12—17 (average Rs. 14–11–0) ..	1,058	132
	31,222	3,773
B. Payable from contingencies		
(7) 18 Cattlemen on Rs. 20 per mensem	4,320	660
(8) 12 Milkmen on Rs. 25 per mensem	3,600	550
(9) 6 Maistris on Rs. 22 per mensem	1,584	242
(10) 6 Bull attendants on Rs. 20 per mensem	1,440	220
(11) Night watchman on Rs. 12 per mensem	864	132
	1,808	1,804
Total ..	3,030	5,577
II. Travelling allowance of superior staff at 25 per cent of pay.	7,805	943
III. Dearness allowance at 16-2/3 per cent of total pay ..	7,172	929
Grand total ..	58,007	7,449

(c) Equipment required at farm

	RS.
Four double-bullock carts at Rs. 200 each	800
Three crude oil engines at Rs. 1,000 each	3,000
Agricultural implements	300
Three wheel barrows	150
Three chaff cutters	750
Milking pails	150
Ten buckets	60
Two balances for weighing fodder	300
Ten milk transport cans	600
Furniture	300
Books	50
Other appliances	500
	6,960
Cost of running crude oil engines at Rs. 2 per day per engine—recurring	1,460

(*d*) *Buildings required*

Cost of new buildings in each year

Designation.	Cost of each building.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
(Number of Farms required) ..	..	1	2	2	3	4	5	6	6	
Farm Manager	4,000	4,000	4,000	..	4,000	4,000	4,000	4,000	..	
Routine clerk	2,500	2,500	2,500	..	2,500	2,500	2,500	2,500	..	
Dairy clerk..	2,500	2,500	2,500	..	2,500	2,500	2,500	2,500	..	
Recorder (2)	2,500	5,000	5,000	..	5,000	5,000	5,000	5,000	..	
Fieldmen (2)	1,000	2,000	2,000	..	2,000	2,000	2,000	2,000	..	
Peon	800	800	800	..	800	800	800	800	..	
Cattlemen (3)	800	2,400	2,400	..	2,400	2,400	2,400	2,400	..	
Milkmen (2)	800	1,600	1,600	..	1,600	1,600	1,600	1,600	..	
Maistri	800	800	800	..	800	800	800	800	..	
Bull attendant	800	800	800	..	800	800	800	800	..	
Night watchman	800	800	800	..	800	800	800	800	..	
Total ..	..	23,200	23,200	..	23,200	23,200	23,200	23,200	..	
Office and sheds for cattle ..	15,000	15,000	15,000	..	15,000	15,000	15,000	15,000	..	
Grand total ..	..	38,200	38,200	..	38,200	38,200	38,200	38,200	..	2,29,200
Maintenance ..	..	225	450	..	675	900	1,125	1,350	..	

(*e*) *Receipts in the average year at the farm*

	RS.
By sale of milk at 16 lb. per day per cow—For 50 cows at Re. 0-3-0 per lb.	34,250
By sale of calves, old animals, etc.	5,750
	40,000

(f) Cost of Government farm

Item.	Ultimate cost.				Cost for eleven months in first year.			
	Non-recurring.		Recurring.		Non-recurring.		Recurring.	
	Details.	Total.	Details.	Total.	Details.	Total.	Details.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	RS.	RS.	RS.	RS.	RS.	RS.	RS	RS.
I. Land—								
(1) Two hundred acres—(Government land to be provided free)	..				..		..	
(2) Reclamation	6,000		..		1,000		..	
(3) Fencing with live fence	6,000		..		1,000		..	
(4) Three wells at Rs. 500 each	9,000		..		1,500		..	
(5) Cultivation expenses at Rs. 20 per acre per annum	..	..	24,000		..		4,000	
		21,000		24,000		3,500		4,500
II. Buildings [as per statement No. 4 (d)]	..	2,29,200	..	1,350	..	38,200	..	225
III. Equipment [as per statement No. 4 (c)]	..	41,760	..	8,760	..	6,960	..	1,460
IV. Staff—Pay and allowances (including staff paid from contingencies)	..	..	..	58,007	..	..	..	7,449
V. Livestock—								
(1) Purchase—								
(a) Three breeding bulls at Rs. 250 each ..	6,300		..	..	1,050			
(b) One hundred and sixty-five cows at Rs. 350 each	3,46,500		..	..	57,750			
(c) Ten work animals at Rs. 200 each	12,000		..	..	2,000			
		3,64,800				60,800		
(2) Maintenance—								
(a) 3 breeding bulls at Rs. 720 each	..	..	12,960	..	..	..	1,980	
(b) 165 cows at Rs. 420 each	..	..	4,15,800	..	..	..	25,025	
(c) 10 work animals at Rs. 200 each	..	..	12,000	..	..	..	1,836	
				4,40,760				28,841
VI. Contingencies	..	..	..	30,000	..	..	..	4,583
VII. Total	..	6,56,760	..	5,62,877	..	1,09,460	..	47,058
VIII. Receipts—By sale of milk and animals	..	..	..	40,000	..	..	..	..
IX. Net expenditure	..	6,56,760	..	5,22,877	..	1,09,460	..	47,058
Or in round figures	..	6,57,000	..	5,23,000	..	1,09,000	..	47,000
Add for increase in dearness allowance	..	43,000	..	57,000	..	11,000	..	3,000
Total ..	..	7,00,000	..	5,80,000	..	1,20,000	..	50,000

5. *Cost of special staff for demonstration of preservation of fodder by ensilaging*

Item.	Ultimate.		For eleven months in first year.	
	Non-recurring.	Recurring.	Non-recurring.	Recurring.
(1)	(2)	(3)	(4)	(5)
		RS.		RS.
Six Agricultural demonstrators' pay (Rs. 75—200). Average Rs. 136-16.	..	9,804	..	825
Dearness allowance at Rs. 24 per mensem each	..	1,728	..	198
Six maistris on Rs. 15—19. Average Rs. 17-2/3	..	1,272	..	165
Dearness allowance at Rs. 16 per mensem each	..	1,152	..	176
One peon at Rs. 12—17 per mensem Average Rs. 14.	..	1,008	..	132
Dearness allowance	..	1,152	..	176
Travelling allowance roughly at half the pay	..	6,000	..	600
Contingencies	..	30,000	..	4,500
Total ..	..	52,116	..	6,772
Or in round figures	..	52;100	..	6,800

Details for figures against contingencies—Size of pit, 500 to 600 cubic feet.

	RS.
Cost of green fodder about 6 tons	150
,, digging	15
,, filling up	10
Total ..	175

A demonstrator may be able to finish one demonstration in five days; that is to say, he may be able to do five demonstrations a month or 60 a year.

Cost of 60 pits = 60 × Rs. 175 = Rs. 10,500.

Allowing for ryots offering to produce their own green fodder for half the number of pits, the amount required for each unit will be roughly Rs. 5,000.

For six units 6 × Rs. 5,000 = Rs. 30,000.

APPENDIX NO. 24

[Referred to in paragraph 433]

Principal commodities and markets

Commodity.	District.	Name of important markets.	Remarks.
(1)	(2)	(3)	(4)
Rice (Assembling markets in producing areas).	Kistna ..	.. Bezwada.	
		Gudivada.	
		Masulipatam.	
		Kavutaram.	
	West Godavari ..	Tadepalligudem.	
	Tanjore ..	.. Kumbakonam	Paddy mainly and rice
		Shiyali.	
		Koradacheri.	
		Mannargudi.	
		Kuttalam.	
	Guntur ..	.. Tenali.	
		Nidubrolu.	
	Nellore ..	.. Nellore.	
	South Arcot ..	Chidambaram.	
	Chingleput ..	.. Conjeevaram.	
	North Arcot ..	Tiruvannamalai.	
	Salem ..	.. Attur.	
	Trichinopoly ..	Trichinopoly.	
Assembling and distributing markets in imports.	Madras City ..	Madras City.	Imported rice.
	Tinnevelly ..	.. Tuticorin.	
	Coimbatore ..	.. Erode.	
	Malabar ..	.. Calicut.	
	Vizagapatam ..	Vizagapatam.	
		Vizianagram.	
Groundnuts (Kernels).	South Arcot ..	Vriddachalam.	
		Tirukkoilur.	
		Villupuram.	
		Tindivanam.	
		Cuddalore.	
	Guntur ..	.. Guntur.	
	Kistna ..	.. Nandigama.	
		Bezwada.	
	Bellary ..	.. Adoni.	
		Bellary.	
		Kottur.	
	Kurnool ..	.. Nandyal.	
	Coimbatore ..	.. Pollachi.	
	Salem ..	.. Salem.	
	Vizagapatam ..	Vizagapatam.	
		Vizianagram.	
	Cuddapah ..	.. Cuddapah.	
Potatoes	Nilgiris ..	.. Mettupalaiyam.	
Eggs	Guntur ..	.. Ongole.	
	Malabar ..	.. Tirur.	
		Calicut.	
		Palghat.	
	Kistna ..	.. Bezwada.	
		Masulipatam.	
	East Godavari ..	Cocanada (Collair lake).	
Citrus fruits	Cuddapah ..	.. Kodur	
		Rajampet.	
	East Godavari ..	Rajahmundry	
	Madura ..	.. Kodaikanal.	
		Ayyampet (Limes).	
	West Godavari ..	Palakol (Limes).	

Principal commodities and markets—cont.

Commodity. (1)	District. (2)	Name of important markets. (3)	Remarks. (4)
Citrus fruits—*cont.*	Malabar (Wynaad).	Calicut. Tellicherry.	
	Salem	Yercaud. Salem.	
	Nilgiris	Mettupalaiyam.	
	Guntur	Tenali (Limes).	
Coconuts	Malabar	Calicut. Badagara.	
	Tanjore	Muthupet. Koradacheri.	
	East Godavari ..	Amalapuram. Ambajipet.	
Tobacco	Guntur	Guntur.	
	Coimbatore	Erode. Palladam.	
	Madura	Dindigul.	
	Trichinopoly ..	Trichinopoly. Karur.	
	Kistna	Mustabada.	
Mangoes	Vizagapatam ..	Vizianagram. Alamanda. Anakapalle.	
	East Godavari ..	Rajahmundry. Tuni.	
	West Godavari ..	Ellore.	
	Kistna	Nuzvid.	
	Chittoor	Chittoor. Damalcheruvu.	
	North Arcot ..	Vellore.	
	Salem	Salem.	
	Malabar	Calicut.	
Cattle	Chingleput	Tiruvottiyur.	
Hides and skins ..	Madras	Madras City. Pallavaram.	
	North Arcot ..	Ranipet. Vaniambadi.	
	Kistna	Bezwada.	
	West Godavari ..	Ellore.	
	Trichinopoly ..	Trichinopoly.	
Coffee	Coimbatore	Mettupalaiyam. Coimbatore.	
	Malabar	Calicut. Tellicherry.	
	South Kanara ..	Mangalore.	
	Salem	Salem.	
Pepper	Malabar	Calicut. Tellicherry.	
Ginger	Malabar	Calicut. Tellicherry.	
Chillies	Ramnad	Sattur. Virudhunagar.	
	Guntur	Guntur.	
	Tinnevelly	Tinnevelly. Pettai.	
	Madura	Theni.	
Jaggery	Vizagapatam ..	Anakapalle.	
	Coimbatore	Kodumudi. Udamalpet.	

Principal commodities and markets—cont.

Commodity.	District.	Name of important markets.	Remarks.
(1)	(2)	(3)	(4)
Jaggery—*cont.*	East Godavari ..	Rajahmundry. Peddapur.	
	North Arcot ..	Vellore.	
	Bellary	Hospet.	
Castor	East Godavari ..	Cocanada.	
	Madura	Madura.	
	Salem	Tiruchengode. Krishnagiri.	
Cotton	Coimbatore.. ..	Tiruppur. Coimbatore.	Cambodia. Karun-ganni.
	Bellary	Adoni. Bellary.	Western and Mungari.
	Kurnool	Nandyal. Kurnool.	Northerns.
	Tinnevelly	Koilpatti.	Tinnies.
	Ramnad	Virudhunagar.	Tinnies.
	Anantapur	Tadpatri. Guntakkal.	Westerns and Northerns.
Turmeric	Coimbatore.. ..	Erode.	
	Cuddapah	Cuddapah.	
	Guntur	Koduru. Duggirala.	
Onions	Cuddapah	Koduru. Cuddapah.	
	Tinnevelly	Tinnevelly (Pettai).	
	Madura	Dindigul. Madura.	
	Coimbatore.. ..	Tirupur (Palladam). Pollachi. Udamalpet.	
	Vizagapatam ..	Anakapalle.	
	Bellary	Bellary.	

APPENDIX No. 25

[Referred to in paragraph 460]

Progress of co-operative marketing societies in the province

Year.	Number of societies.	Number of members.	Paid-up share capital.	Loans issued on the pledge of produce.	Value of stock received during the year including stock held at the beginning of the year.	Value of stock released without sale.	Value of stock through the societies.	Net profits.	Net loss.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS.	RS.
1936–37	111	12,015	1·62	26·16	70·72	18·56	30·27	27,503	7,082
1937–38	118	18,936	1·84	62·12	107·59	32·76	24·72	42,267	9,875
1938–39	134	27,548	*	95·86	179·05	52·13	45·87	43,463	11,482
1939–40	149	36,787	*	107·30	230·52	97·27	56·82	66,956	19,596
1940–41	161	45,637	*	142·56	303·21	124·04	46·57	67,000	20,000
1941–42	170	..	..	147·07	373·37	174·45	75·33	*	*
1942–43	172	61,118	6·58	196·76	477·16	186·58	211·15	*	*
1943–44	181	75,828	7·85	139·18	412·91	191·32	91·35	1,34,684	1,31,822

* Figures not available.

Appendix No. 26

[Referred to in paragraph 509]

Statement showing the progress of co-operative central banks

Year.	Number of central banks.	Share capital.	Deposits and other borrowings.	Reserve Fund.	Total working capital.	Book profit.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.
1920–21 ..	32	18·82	141·19	2·97	162·30	2·06
1921–22 ..	32	24·11	183·63	4·20	211·12	3·89
1922–23 ..	32	28·38	215·20	5·82	247·82	4·31
1923–24 ..	32	32·41	257·16	7·14	295·34	5·80
1924–25 ..	31	36·92	300·61	8·90	344·64	7·12
1925–26 ..	31	40·23	345·98	10·39	395·23	7·23
1926–27 ..	31	44·33	422·67	12·59	477·82	8·87
1927–28 ..	31	48·70	481·18	16·52	542·94	12·19
1928–29 ..	31	52·08	507·91	18·99	576·25	13·21
1929–30 ..	31	56·54	550·59	22·46	627·18	13·34
1930–31 ..	32	57·86	535·07	24·99	615·96	13·64
1931–32 ..	32	57·49	493·69	27·32	576·28	..
1932–33 ..	32	56·10	505·25	28·90	588·74	..
1933–34 ..	32	55·05	451·06	30·10	553·21	13·75
1934–35 ..	32	54·53	402·10	31·33	511·13	14·25
1935–36 ..	32	53·55	389·08	32·74	501·43	14·24
1936–37 ..	31	50·41	387·56	33·45	499·79	11·73
1937–38 ..	31	49·79	409·68	34·28	523·54	10·64
1938–39 ..	30	49·58	452·03	34·58	566·24	11·12
1939–40 ..	30	49·42	465·02	34·67	580·30	10·73
1940–41 ..	30	49·71	478·35	35·51	595·10	11·68
1941–42 ..	30	50·21	495·73	36·69	614·02	11·70
1942–43 ..	30	51·82	555·19	37·73	673·16	10·78
1943–44 ..	30	55·90	626·96	39·06	750·53	11·29
1944–45 ..	30	62·59	717·20	40·67	850·33	11·47

APPENDIX No. 27

[Referred to in paragraph 505]

Statement showing progress of primary agricultural (unlimited liability) credit societies

Year.	Number of societies.	Number of members.	Average membership per society.	Loans outstanding against members.	Average loan per member.	Share capital.	Borrowing.	Reserve fund and other funds.	Working capital	Profit.	Loss.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				RS. LAKHS.	RS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.	RS. LAKHS.
1920–21	5,199	274,808	53	159·65	58·1	18·05	156·23	9·58	183·86	1·93	2·84
1921–22	6,190	325,536	53	193·72	59·5	22·87	188·27	10·71	221·86	3·35	3·17
1922–23	7,076	375,500	53	230·68	61·4	28·47	222·66	12·89	264·02	4·02	4·51
1923–24	8,077	437,292	54	274·64	62·8	35·39	262·74	15·66	313·80	4·68	6·33
1924–25	9,131	486,105	53	311·16	64·0	42·48	295·18	18·88	356·54	5·68	7·01
1925–26	9,787	522,061	53	345·70	66·2	48·59	325·02	22·73	396·34	6·64	8·23
1926–27	10,954	581,366	53	428·79	73·8	57·73	401·31	27·27	486·32	9·20	9·51
1927–28	11,911	627,774	53	503·04	80·1	66·60	468·51	32·98	568·09	9·62	10·97
1928–29	12,323	652,285	53	538·23	82·5	73·40	495·00	39·29	607·40	12·22	11·76
1929–30	12,478	670,037	54	573·51	85·6	78·79	525·70	46·65	651·14	11·30	13·08
1930–31	12,246	670,037	55	573·51	85·6	80·91	505·10	53·88	639·89	7·88	20·37
1931–32	[Separate figures not available.]										
1932–33											
1933–34											
1934–35	11,112	531,225	48	351·15	66·1	58·13	314·88	83·54	456·55	9·26	23·47
1935–36	10,943	524,986	48	344·54	65·6	55·76	307·35	89·62	452·73	7·21	21·01
1936–37	10,456	509,307	49	316·88	62·2	51·80	280·48	96·68	428·96	6·34	19·26
1937–38	10,451	522,615	50	321·02	61·4	51·25	285·92	98·61	435·78	4·91	19·26
1938–39	10,743	565,301	53	351·99	62·2	53·11	316·89	78·42	471·11	4·03	20·29
1939–40	11,041	597,741	54	332·48	55·6	54·60	316·02	80·02	473·26	4·19	20·52
1940–41	10,934	606,171	55	382·76	63·1	53·87	290·21	80·92	451·20	4·95	20·21
1941–42	10,907	618,821	57	321·98	52·0	53·78	286·85	82·74	446·59	5·30	19·89
1942–43	10,893	627,767	58	278·08	44·3	53·76	336·84	85·31	407·17	6·33	17·65
1943–44	10,821	628,023	58	260·77	41·5	54·11	235·23	86·40	394·02	5·87	15·65
1944–45	10,792	637,036	59	272·58	42·8	52·07	233·47	119·85	406·39	5·95	14·58

APPENDIX No. 28

Referred to in paragraph 584]

Number of maternity relief and child-welfare centres in rural areas (districts exclusive of municipalities) during the period 1935–44

Year.	Maternity and child-welfare centres.	Medical women.		Number of Health visitors.	Midwives.		Number of cases recieving skilled aid at child birth.	Percentage of cases recieving skilled aid at child birth.	Maternity beds in hospitals and dispensaries.		Live births.	Still births.	Number of infantile deaths.	Infantile mortality rate per 1000 births.	Maternal deaths.	Maternal mortality rate per 1.000 births.
		Total.	Per 1000, births.		Total.	per 1,000 births.			Number.	Per 1,000 births.						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1935	87	91	0·06	9	844	0·55	62.678	4·08	389	0·25	1,521,169	14,123	270,105	177·47	12.340	8·03
1936	100	114	0·08	8	958	0·63	71,332	4·70	427	0·28	1,500,334	16,571	244,292	162·75	11,508	7·59
1937	124	51	0·03	8	934	0·60	84,459	5·40	420	0·27	1,548.983	16,252	261,026	168·51	12.565	8·03
1938	131	31	0·02	8	1,041	0·66	79,640	5·07	364	0·23	1,552,697	17,583	256,383	165·19	13.294	8·47
1939	132	113	0·07	10	1,160	0·75	84,313	5·43	309	0·20	1,533,636	18,739	268,522	175·08	13,394	8·63
1940	157	129	0·08	14	1,257	0·90	96,741	5·52	255	0·22	1,529,924	18,839	257,450	168·28	12,716	8·21
1941	157	111	0·06	17	1,228	0·91	90.982	5·68	438	0·51	1,547,844	16,711	263,567	170·28	13,663	8·73
1942	151	126	0·08	11	1,158	0·75	93.220	6·05	430	0·21	1,524,580	16,016	243,300	159·58	12,743	8·27
1943	153	97	0·07	10	1,137	0·80	89,042	6·29	729	0·52	1,399,795	13,998	239,346	170·98	11,416	8·07
1944	158	68	0·05	9	955	0·71	59,075	4·38	325	0·24	1,337,025	12,560	256,296	191·69	12.968	9·61

Appendix No. 29

[Referred to in paragraph 584]

Details of maternity and child-welfare work under districts (excluding municipalities)

Year.	Brought under care. Total number of mothers (antenatal and labour).	Ante-natal mothers.	Labour cases.	Infant.	Pre-school.	Home visits. Women medical officer.	Health visitor.	Midwives. Ante-natal.	Midwives. Post-natal.	number held.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1935	20,379	18,067	6,272	5,339	3,343	6,900	6,348	62,583	32,539	1,247
1936	33,136	28,802	8,980	12,477	4,271	8,592	11,924	111,868	75,149	1,564
1937	59,427	39,661	12,163	9,075	16,800	11,783	19,441	147,687	91,930	9,989
1938	39,780	33,237	13,847	15,941	23,819	18,077	16,082	160,084	110,497	1,700
1939	41,067	36,375	19,345	7,309	3,487	16,816	22,237	200,609	143,026	2,779
1940	48,757	49,278	18,741	11,871	5,283	18,904	35,723	247,126	161,056	2,274
1941	60,383	48,759	18,102	12,732	14,569	27,104	32,917	237,501	142,612	1,455
1942	47,654	41,032	18,447	13,370	13,589	21,870	37,695	235,557	159.656	1,307
1943	61,079	37,680	17,096	12,860	14,989	19,495	25,272	221,605	158,338	1,032
1944	68,527	48,006	17,591	10,376	6,919	15,576	27,624	233,548	150,484	1,122

Year.	Clinics attendance. Ante-natal.	Infant.	Pre-school.	Nursing mothers.	Mother's classes. Number.	Attendance.	Other activities. Lantern lectures, etc. Number.	Attendance.	Schools visited for health education. Number.	Attendance.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1935	6,134	16,254	61,039	6,741	495	12,636	173	5,459	159	6,696
1936	6,524	22,258	73,309	7,974	946	15,140	200	10,246	166	7,351
1937	4,069	13,031	67,862	7,492	1,177	18,689	159	7,726	254	7,366
1938	4,502	9,939	19,490	9,723	825	19,161	414	15,759	217	11,334
1939	10,237	13,532	16,761	10,948	1,712	29,633	197	13,617	325	15,155
1940	11,263	14,278	11,335	16,789	1,607	35.902	198	16,411	545	32,130
1941	9,110	9,397	15,355	11,886	1,153	23,544	266	16,100	388	24,147
1942	12,251	10,200	14,908	13,431	1.407	24.348	416	14,715	365	22,973
1943	9,068	7,098	12,973	9,630	783	18,400	266	6,437	321	21,144
1944	4,954	4,100	8,117	5,209	485	8,894	472	9,665	257	12,991

APPENDIX No. 30

[Referred to in paragraph 574]

Statement showing the progress of rural water-supply works carried out till the end of 31st March 1946 and those to be carried out according to the 10-year programme of works

District.	Number of works proposed according to the 10-year programme for the first seven years of the programme.	The estimated cost of works in column (2).	Number of works actually carried out during 1939–40 to 1945–46.	The cost of the works in column (4).			Number of works in column (2) which were actually carried out during the first seven years.	Number of works in column (4) which were outside the original 10-year programme.	Number of works in column (2) yet remaining to be taken up (the works executed from 1939–40 may be included separately).	Estimated cost of works in column (8).			Number of works proposed for the three years from 1946–47 under 10-year plan.	The estimated cost of works in column 10.	Remarks.
(1)	(2)	(3)	(4)	(5)			(6)	(7)	(8)	(9)			(10)	(11)	(12)
		RS.		RS.	A.	P.				RS.	A.	P.		RS.	
Vizagapatam ..	2,341	27,38,442	652	3,57,838	13	11	463	189	1,878	7,09,965	0	0	1,149	7,97,344	
East Godavari ..	607	12,77,806	243	5,19,891	0	0	243	..	318*	6,91,545	0	0	599	8,49,280	* Excludes 46 works abandoned.
West Godavari ..	1,865	14,87,900	116	1,64,197	12	0	82	34	1,783	14,26,584	0	0	1,984	16,06,184	
Kistna	1,870	9,52,140	297	1,13,318	0	0	233	64	1,637	8,39,000	0	0	853	3,34,400	
Guntur	1,490	11,84,040	234	2,86,401	11	1	234	Nil.	1,256	10,62,076	0	0	640	6,31,840	
Nellore	1,213	12,84,565	720	6,87,760	0	0	547	173	666	6,52,808	0	0	560	6,47,398	
Cuddapah ..	1,364	19,54,950	621	5,51,371	9	1	471	150	743*	10,03,050	0	0	580	4,13,050	* 150 works executed before 1939–40.
Anantapur ..	390	4,64,275	467	4,08,800	0	0	150	317	240	2,43,897	0	0	213	96,926	
Bellary	624	16,25,300	252	5,86,337	10	2	156	96	468	7,38,962	5	10	312	5,04,500	
Kurnool ..	569	7,09,610	101	1,26,979	0	0	98	3	337*	3,98,291	0	0	267	2,25,380	* Excludes 74 works abandoned and 60 works under execution.
Chingleput ..	1,915	14,28,205	514	2,40,962	0	0	449	65	1,466	11,13,868	0	0	1,002	7,01,400	
Chittoor ..	2,952	A	137	1,00,544	6	2	137	Nil.	2,815	B			213	C	A, B and C. Estimates have not been prepared for all the works.
North Arcot ..	1,802	13,14,980	243	2,58,754	0	0	216	27	1,586	7,64,126	0	0	1,125	11,75,767	
South Arcot ..	2,934	17,91,815	220	1,95,882	0	0	220	..	2,714	15,85,933	0	0	1,020	5,45,580	
Tanjore	3,288	20,22,120	389	1,74,315	2	0	281	108	3,007	18,49,305	0	0	1,386	8,52,390	

Statement showing the progress of rural water-supply works carried out till the end of 31st March 1946 and those to be carried out according to the 10-year programme of works—cont.

District. (1)	Number of works proposed according to the 10-year programme for the first seven years of the programme. (2)	The estimated cost of works in column (2). (3)	Number of works actually carried out during 1939–40 to 1945–46. (4)	The cost of the works in column (4). (5)	Number of works in column (2) which were actually carried out during the first seven years. (6)	Number of works in column (4) which were outside the original 10-year programme. (7)	Number of works in column (2) yet remaining to be taken up (the works executed from 1939–40 may be included separately). (8)	Estimated cost of works in column (8). (9)	Number of works proposed for the three years from 1946–47 under 10-year plan. (10)	The estimated cost of works in column (10). (11)	Remarks. (12)
		RS.		RS. A. P.				RS. A. P.		RS.	
Trichinopoly ..	2,774	11,09,600 (*a*)	370	3,29,482 0 0	247	123	2,527	37,90,500 0 0 (*b*)	800 (*c*)	12,00,000	(*a*) The cost of 2,774 wells at Rs. 400 for each well.
Madura	1,898	9,19,900	417	2,10,735 7 0	417	Nil.	1,378 (*a*)	6,68,784 6 5	651	3,01,650	(*a*) Excludes 103 works executed before 1939–40.
Ramnad ..	2,699	45,84,185	626	2,69,066 0 0	626	Nil.	2,073	43,15,119 0 0	995 *	11,68,855	* After finishing the works in column (10) the arrears of works will be taken up for execution.
Tinnevelly ..	2,087	2,77,085	601	1,94,129 12 8	283	318	1,804	2,74,208 0 0	828	1,24,641	
Coimbatore ..	413	8,26,000	179	1,42,104 14 0	179*	Nil.	232	4,64,000 0 0	166	3,32,000	* Two works abandoned.
Nilgiris	83	8,62,340	12	47,880 0 0	3	9	80	3,54,480 0 0	49	5,06,000	
Salem	782	3,91,000	445 (*a*)	2,72,738 15 3 (*b*)	419	26	271 (*c*)	1,35,500 0 0	297	1,48,500	(*a*) 260 completed works. 185 works in progress.
South Kanara ..	127	2,05,400	111	1,72,364 0 0	111	Nil.	16	21,200 0 0	25	51,000	
Malabar	203	3,50,100	109	75,748 12 0	89	20	114	1,75,100 0 0	86	1,46,200	
Total ..	36,290	29,761,758	8,076	64,87,603 13 4	6,354	1,722	29,409	2,37,78,301 12 3	15,800	1,33,60,285	Excludes 527 works either abandoned or executed before 1939–40.

(*b*) Approximate cost at the rate of Rs. 1,500 for each well.
(*c*) 160 works are being proposed for each year.

(*b*) Includes cost of special staff also.
(*c*) Excludes 6 works executed before 1939–40. Excludes 86 works included in the programme and added subsequently.

APPENDIX No. 31

[Referred to in paragraph 566]

Rural housing: Action taken in certain European countries.

(From League of Nations' Publication, 1939—Economic Intelligence Service—" Urban and Rural Housing ".)

Belgium

Houses built in the country since the first World War generally offer a good average standard of comfort. The old dwellings leave a great deal to be desired. The kitchen serves as a common room and often has a bed in it. There may be one, two, or in exceptional cases, three other rooms. Most of these old houses are small, low-roofed and damp, the floor being generally of beaten earth or brick, and the rooms badly ventilated. Agricultural workers are particularly badly housed. The National Society for Cheap Houses and Dwellings empowered local societies to build rural houses with gardens of from 5 to 6 acres. Until 1935, however, there was no society which specialised in rural building. Since 1935, the National Small Holdings Society encouraged the establishment of regional societies to purchase building sites, develop them as small holdings, erect the necessary buildings and let or sell them to families of modest means, where necessary, with the aid of a loan from the National Society. For this purpose, the State provided the new organization with a credit of 300 million francs as and when required. State advances were repayable in sixty-six annual instalments of 2·08 per cent based on an interest rate of 1 per cent; the National Society was authorized to charge a slightly higher rate of interest for such loans, in order to cover its management charges. At the end of 1937, there were forty-nine local societies and five others were in the course of being constituted. All were based on the co-operative principle. In addition to a large number of private individuals and various organizations such as social foundations, workers and agricultural organizations, the State, the Provinces and certain communes all subscribed towards their issued capital which amounted to 7 million francs in all. State advances up to 55 million francs had been placed at the disposal of the National Society and a fresh advance of 22½ millions was approved for 1938. The society assisted about 1,300 families. The cost of building work carried out with the assistance of these loans was 27 million francs spread over 563 rural dwellings with farm buildings for industrial workers, fifty-nine buildings built to replace demolished slums, eighty-four buildings for small holdings, and forty-six reconditioned old houses. The average cost of buildings with out-buildings amounted to 38,000 francs and the average loan granted in such cases was 32,000 francs.

United Kingdom

By the end of March 1938, about 737,000 new dwellings had been erected in rural districts in England and Wales since the first World War. Still, there is urgent need for further accommodation for the agricultural population. Most of the new houses have been occupied by workers and middle class families from neighbouring towns or new factories set up in rural districts. Meanwhile, although the agricultural population is stationary the number of separate families increases. Old people now live longer and with the help of old age pensions are able to live alone instead of, as formerly, with relatives. Thus fewer cottages become

available for young married couples. Further the existing accommodation is to a large extent defective. The number of unfit houses included in the five-year programmes of slum clearance submitted to the Minister of Health in 1933 was nearly 47,000. Many cottages while not unfit, do not offer the hygiene and comfort which young families may reasonably expect. The overcrowding survey of 1936 shows that, of the 1·4 million working class dwellings in rural districts about 42,000 or nearly 3 per cent were overcrowded according to the legal standard of accommodation. In Scotland, the replacement needs for the period 1934–38 in rural counties was estimated in 1933 at somewhat more than 2,700 or only 2·2 per cent out of 122,000 working class dwellings. A representative survey undertaken in 1936 by the Scottish Housing Advisory Committee indicates however that these estimates bear no relation to the facts because approximately 17 per cent of the working class dwellings in the investigated parishes were found entirely unfit for human habitation. It was stated that only 16 per cent were completely fit; 33 per cent had water inside and 23 per cent had water closets, whereas 29 per cent had no sanitary convenience, 41 per cent were damp and 28 per cent badly lit. According to the overcrowding survey of 1936 more than 12,500 or about 10 per cent of all working class dwellings in rural counties were overcrowded. The root of the housing problem in rural areas is the low rent paying capacity of agricultural labourers and other rural workers. Low wages have long made for low rents, bearing little, if any, relation to the cost value of the houses. Private enterprise has therefore not been able to provide dwellings for rural labourers. Owners of tenement houses let to rural workers have often not found it remunerative to undertake repairs. It was recognized by the Scottish Housing Advisory Committee that " in general, no section of the population is compelled to live in such consistently bad housing conditions as farm servants." The legislation relating to urban housing applies also to rural districts with minor modifications as to procedure, or in some cases, as to the rate of subsidies, in order to ensure greater effectiveness in rural areas. Thus the Housing (Financial Powers) Act, 1924, sanctioned larger subsidies (£12, 10 sh. for forty years instead of £9) for the erection of dwellings in agricultural parishes. In England and Wales, the number of buildings erected in rural districts with State assistance provided for by the Housing Acts of 1919, 1923 and 1924 amounted to about 237,000, half of which were in agricultural parishes. In Scotland, nearly 30,000 new dwellings were erected in rural areas as a whole, but only just over 5,000 of these were in typical agricultural counties. In the county full use was apparently not made of the subsidies granted for the erection of houses to meet general needs. These subsidies were terminated in 1933. The Housing (Rural Workers) Act, 1926, empowered county councils to assist in financing the improvement of old houses or the conversion of existing buildings for occupation by agricultural workers, provided that the work involved an expenditure of at least 50 on houses of which the value on completion did not exceed £400. Subsidies may take the form either of lump-sum contributions or of annual payments over a maximum period of 20 years. The total subsidies granted may not exceed two-thirds of the outlay involved or up to £100 per dwelling. The benefit of the subsidies is to be passed on to the tenants whose rents during 20 years may not be raised above the normal level for agricultural workers in the district plus 4 per cent of the owners' share of the cost. County councils may, in addition to subsidies, grant loans for the work up to 90 per cent of the value of the improved dwelling. Exchequer assistance

may be granted in respect of the subsidies paid under this Act on the basis of half the annual charge which would have been incurred had the subsidies been met from a 20 year loan. In 1938, the Act was amended so as to allow for further grants on a similar basis in respect of dwellings which had already been improved with the assistance provided for by the Act, when such dwellings were overcrowded. On the 31st December 1937, the grants paid or to be paid and the consequent annual liability on the Exchequer were as shown below :—

——	Number of grants.	Amount.	Annual Exchequer liability.
		£ (000 sh.)	£ (000 sh.)
England and Wales ..	16,995	1,431·7	52·5
Scotland	30,548	2,665·9	97·2

The scope of the grant included structural alterations, repair, provision of extra accommodation, water-supply, drainage and other sanitary conveniences but not ordinary repair work or minor improvements which could be executed at a reasonable expense. The Housing Act, 1930, provided for an Exchequer subsidy in respect of new houses built by the Rural District Councils to replace unfit property. The grant was to take the form of a payment of 45 sh. annually (in Scotland 50 sh.) for each person displaced from an unfit house or 50 sh. (in Scotland 55 sh.) if the house was situated in an agricultural parish. The annual contribution from local rates amounted to £3, 15 sh. for each new house provided. If the house was required for the agricultural population, £1 of that amount might be claimed by the rural district council from the county council. Both Exchequer and rate contribution was to be paid for forty years. The Act assigned to the county council the duty of keeping itself in constant touch with housing conditions in rural districts and of satisfying itself that adequate measures were taken to ensure necessary improvements. By the end of March 1938, the slum clearance programmes adopted by rural district councils in England and Wales included nearly 25,000 dwellings in clearance areas and over 36,000 individual dwellings. In Scotland, new dwellings to replace unfit houses in the period 1934–38 amounted to about 2,500. To some extent, overcrowding was abated by the demolition or closing of unfit houses dealt with under the slum clearance programmes and by the schemes of reconditioning and enlargement under the Housing (Rural Workers) Act. The Housing Act, 1935, lays upon local authorities the duty of taking direct measures to abate overcrowding. In some cases existing accommodation can be better distributed. Where new accommodation is needed, the Act provides for a special Exchequer contribution of not less than £2 or more than £8 per house, payable annually for forty years, in England and Wales, the county council and the Rural District Council being each required, in addition, to contribute an annual sum of £1 for the same period. In Scotland, there is an annual Exchequer subsidy of £6, 15 sh. for forty years, the county council contributing from rates the equivalent of £3, 5sh. for the same period. In most rural districts, dates were fixed after which it became an offence to create new overcrowding. The Housing (Financial Provisions) Act, 1938, replaced, in England and Wales, the subsidies for slum clearance and relief of overcrowding by a uniform contribution. The Exchequer subsidy will be £10 a year for forty years for each house built by a local authority for the agricultural population whether for slum clearance, the relief of overcrowding or general needs; the district and the county council will each contribute £1 a year for a like period. The capitalised value of the combined

contributions is £250. In special cases, an Exchequer subsidy up to £10 a house will be available through the local authorities for houses built for agricultural workers by private persons. The Housing (Agricultural Population) (Scotland) Act provides for the payment of an Exchequer subsidy ranging from £10, 10sh. to £15 per house for forty years for houses built by local authorities to meet the general needs of the agricultural population. For houses erected on remote sites, the grant may be increased beyond £15. The Act empowers local authorities for a period of five years to give grants for the replacements of unsatisfactory houses occupied by agricultural workers, landholders and others. The grant is limited to half the cost with a maximum of £160 for a three-roomed cottage and £200 for a four-roomed cottage. The Exchequer share of the expenditure on grants will be three-quarters in the highlands and islands, three-quarters in respect of houses intended for farm servants and seven-eighths in respect of other houses. The house must contain at least three rooms and must normally be provided with a water closet, a drainage and a fixed bath in a bath-room.

Denmark

Since 1899, the State has been pursuing a large-scale policy to encourage the establishment of small agricultural properties. Up to 1937, with the assistance of State loans, more than 18,000 small farms had been established and a law was passed in 1934 in respect of this activity. The holdings which must be large enough to enable the purchaser's family to earn a livelihood on them by its own labour are taken either from State lands or from private estates bought by the Government or by small holding associations with the assistance of State credits. Persons competent to undertake the working of a small farm and with sufficient savings to be able to purchase stock can obtain advances which generally cover the entire cost of purchase of the land (maximum 8,500 kroner) and the erection of the necessary buildings (maximum 12,000 kroner). Interest on that part of a loan which is applied to the purchase of land is at 2 per cent per half year ; after five years this part is redeemable by half-yearly instalments of 2¼ per cent, of which 2 per cent on the balance represents interest. Of the building credits, only a portion about two-thirds bears interest which is at 2 per cent per six months. Redemption does not begin until the land purchase loan has been completely repaid. A committee formed to consider measures to remedy the dearth of labour in the country side, stressed the necessity of providing agricultural workers with good housing. To give effect to the committee's proposals, Parliament voted a credit of 6 million kroner for each of the financial years 1938–39, 1939–40 and 1940–41 to be employed in the form of loans to agricultural workers wishing to build houses for themselves. Loans may cover land purchase costs (maximum 1,000 kroner) and nine-tenths of the building cost (maximum 7,000 kroner). Loans for the purchase of land are redeemable by half-yearly instalments of 2¼ per cent of the original total amount, of which 2 per cent on the balance represents interest. As regards building loans, one-quarter (maximum 1,500 kroner) is free of interest and the rest bears interest at 4 per cent per annum. The interest free part of the capital sum is redeemable in 15 to 20 years; at the end of this period, a half-yearly instalment of 2¼ per cent will become payable on the rest, of which 2 per cent on the balance represents interest. Preference in the granting of credits of this kind will be given to persons with more than two children and some small savings. Large families may obtain advances

to cover not only the cost of the site, but also 95 per cent of the building costs, and such advances will be free of all redemption charges so long as the parties have more than two children under 16 years of age.

Finland

Housing conditions in agricultural and forest areas were investigated during the summer of 1937. In the country, over a third of the houses had one room and a kitchen. A quarter were single room dwellings. In comparison with 1901, however, there had been a marked trend towards roomier dwellings. Almost a fifth were in a more or less dilapidated condition and 3 per cent were stated to be unfit for habitation. In about a quarter of the total, there were more than three persons per room, these houses accommodating a third of the population. The public authorities aim chiefly at promoting home settlement. Special funds are financed out of the ordinary State budget and by borrowings from other public funds. First mortgage loans were granted generally through local funds managed by the communes to agricultural or forest workers wishing to build a house or establish a small farm. The maximum loan granted solely for house building purposes is 15,000 marks, or including outbuildings 25,000 marks. Advances should not exceed 75 per cent of the total costs plus the value of the beneficiary's labour which might amount to 20 per cent of the total cost of the undertaking. The period of redemption was 31 years, the annual charge being 5 per cent of which 3 per cent was interest: A borrower might, by carrying out certain additional work such as clearing, building in certain cases, be exempted from payment of the annual charge during the first year or few years. For a few years, the State carried out by its own labour organizations all building work in connection with the settlement of its own lands or had such work carried out by settlers at a fixed price. The most usual type of building was the small detached wooden house of a gross floor area of 67 square metres and containing one room, a large kitchen used as a living room, a pantry, a clothes cupboard, and an entrance; two little attic rooms could be added later. During the period 1918–1936, the number of loans granted for building work was 46,748 and the amount involved was 324·9 million marks. To give effect to the proposals of the Special Commission for the study of rural housing, Parliament in 1938 voted 15 million marks to be used in grants and loans for the improvement of existing rural dwellings. Loans up to 20,000 marks or 75 per cent of the cost of the work may be granted to owners of a dwelling house for repairs or extensions or for the replacement of a dilapidated house by a new one. Poor house owners with at least three children under 16 may receive subsidies the amount of which is inversely related to the contribution they can reasonably make to the work either in cash, materials or labour. Individual grants may amount to as much as 4,000 marks or 50 per cent of the cost of the undertaking. If a loan is also obtained, the maximum combined total may not exceed 22,000 marks or 85 per cent of the costs.

France

Cheap housing organizations carry on their work in the country side as well as in urban districts. Regional agricultural credit societies have been assimilated to housing credit societies and may thus act as intermediaries in the matter of State loans granted for the construction or purchase of small family houses in application of the cheap housing

laws. The Loucheur Law applies in particular to agricultural workers, small owners of tenant farmers in modest circumstances and habitually working alone or with one workman or members of their own family, and also to small rural craftsmen. It was provided that one-third of the annual appropriations made under the Loucheur Law should be reserved for rural communes. The rural population has benefited largely by this assistance. In part, the loans have been used for the reconditioning and modernization of dwellings already existing. From pre-war days, the agricultural credit banks have granted individual long-term loans for the purposes of helping agricultural workers and small farmers to purchase, recondition, convert and reconstitute rural small holdings which the borrowers undertook to farm themselves or with the aid of their families. New bases for this activity were furnished by the law of August 5th, 1920, providing for the organization of agricultural credit. The resources from which the long-term loans are derived come from the funds with which the State has endowed the National Agricultural Credit Society and from special appropriations voted by Parliament in 1929 and 1932. Since 1935, individual loans may not amount to more than 60,000 francs. The maximum period allowed for repayment is 30 years. They must be secured by a registered mortgage and a life insurance. The rate of interest is usually 3 per cent. Between 1921 and 31st December 1937, nearly 80,000 loans were granted to a total sum of 1,372 million francs. Under a Law of July 31st, 1929, regional regulations were to be drawn up determining the general sanitary conditions to be complied with in the case of wage earners, dwellings in agricultural undertakings, more particularly as regards air space, lighting, sleeping accommodation and lavatory accommodation. It authorized agricultural credit societies to grant rural landowners individual long-term loans at a reduced rate of interest for the purpose of facilitating the construction, reconditioning, improvement or conversion of buildings intended for agricultutal workers' dwellings. The Decrees of May 24th and June 17th, 1938, improved the terms on which the loans were to be granted. Certain reductions in interest, *inter alia*, were introduced in favour of landowners who were the heads of large families. Agricultural workers' unions and Chambers of Agriculture may obtain from the societies loans for any organizations likely to facilitate improvements in the housing of workers in different branches of agriculture. In a more general way than the measures mentioned above, certain provisions of the Decree of May 24th, 1938, tend to encourage the improvement and reconditioning of rural dwellings. Special organizations have been set up, in particular departmental rural building committees whose duty it is to give technical advice. Farmers and rural craftsmen may apply to agricultural credit societies for loans to be used for the purpose of improving their dwellings on the same terms as loans for small agricultural property. The same possibilities are available for rural communes in connection with schemes for the general improvements of housing conditions in built-up areas, more particularly for the demolition of old and decayed blocks of buildings and through the execution of sanitary improvement work.

Netherlands

Dwellings in rural areas are inferior to those in towns and are smaller. The houses of agricultural labourers, in particular, often contain on the ground floor only a kitchen used as a living room with two or three cupboards, beds and an entrance hall. The left serves as a store room for

crops. Apparently, slums are also more common in the country than in the towns. Nevertheless, considerable progress has been achieved and a fifth or a quarter of the new buildings each year are in communes with less than 10,000 inhabitants. The Housing Law requires rural, as well as urban authorities to frame building regulations, to supervise housing conditions, to compel landlords to recondition dwellings which fail to satisfy the regulations and to evacuate those which are declared unfit for habitation. The loans granted by the State to housing societies recognised as of public utility are also available to the rural communes. Similarly with the object of encouraging slum clearance the State and the communes grant a joint subsidy of one florin per week for each new dwelling intended to replace an evacuated dwelling, thus enabling the rent to be reduced. There are certain measures specially applicable to rural areas. Since, 1927, the occupants of a dwelling evacuated after being condemned may be helped to obtain another dwelling by means of a non-reimbursable grant not exceeding half the cost of the building or 600 florins in all, half of this being paid by the treasury and half by the commune. This grant may be increased to 900 florins in the case of large families. In order to make up the necessary capital, the person concerned may also be granted a loan repayable in thirty years by fixed annual instalments. Between 1928 and 1934, the State made grants amounting to some 64,500 florins for the building of 231 dwellings. The Law of 1918 on agricultural workers allows loans to be advanced for the establishment of small agricultural undertakings. Agriculturists must possess at least 1/10 of the sum required to purchase the house or to buy the site and build a house therein. The loan is repayable in 30 equal annual instalments. From 1919 to the end of 1937, 5,242 such loans were granted.

Norway

The commonest type of dwelling in the country is the three room, one usually consisting of a large kitchen and two bed rooms. According to the 1930 census, a quarter of all rural households lived in dwellings of this type, while 17 per cent and 8 per cent respectively had only either two rooms or one room. About 13 per cent of all the households or a fifth of the population lived in dwellings with more than two persons per room. The Norwegian State Small Holdings and Dwellings Bank provides advances to assist the building of small one-family houses and to enable families with small savings to acquire an agricultural small holdings. Such loans require a mortgage security as well as a guarantee by the local authorities bear interest at 4 per cent, and are repayable from the sixth year by forty-two fixed annual instalments. The State pays the difference between the rate of interest charged by the Bank and the rate it pays itself. In addition, state subsidies consisting of seven years interest and a third of the cost of erecting out-houses are often granted. The maximum loan for the building of small one-family houses (without land for cultivation) is 4,500 kroner, and the maximum amount securable on mortgage is 90 per cent of the value of the building which must not be more than 10,000 kroner. Interest is fixed at 4½ per cent and repayment by six monthly instalments begins with the third and ends with the thirtieth year. Between 1935 and 1938, Parliament voted 2·1 million kroner to be used in subsidies for the improvement of unfit dwellings in the country and in fishing districts. At first no individual grant could exceed 400 Kroner but since 1937, the maximum has been raised to 500 kroner. Subsidies are only granted to persons whose income is too small for them reasonably to be expected to repair

their dwellings entirely at their own expense. Precedence must be given to large families. Subsidies may only be employed for the purchase of materials and are only paid on the completion of the work. More than 6,000 rural dwellings have been repaired, enlarged or in some cases rebuilt with the help of these subsidies during the years 1935—1938.

Sweden

The number of households in the country is constantly increasing. Nearly, 60 per cent of the houses consist of two rooms and one kitchen; more than 25 per cent one room and a kitchen while 6 per cent contain only one room or a kitchen. Half the families with cultivable lands of less than a hectare have only one room and a kitchen. The dwellings are often defective and overcrowding is widely prevalent. From 1905 to 1937, a sum of 131 million kroner was allocated to the construction of 36,561 small residential properties. During the years 1923—1937, 38,182 borrowers received in addition subsidies amounting in all to 11 million kroner. Since 1933, advances have been made on favourable terms to provide workers engaged in lumbering, agriculture, road making with a dwelling and a little land in order to make life somewhat easier when they are out of work. Such loans are granted only to persons with no resources and on condition that the holdings thus acquired should never be encumbered with other debts. Individual loans may amount to 100 per cent of the value of the property less the value of the labour furnished by the borrower himself. The amount a borrower may receive was at first fixed at a maximum of 6,000 kroner; but since 1938, as a result of a rise in building costs, the maximum has been increased to 7,000. The loans are free of interest and are non-redeemable during the first five years. At the end of this period, two-thirds of the capital sum are repayable by annual instalments of one-thirtieth. The communes must guarantee the whole amount of any advance until it becomes redeemable; afterwards, they are responsible for only a quarter of any possible loss. Between 1933 and 1938, a sum of 34·5 million kroner was allocated under this scheme to the establishment of 6,000 small properties for workers. In 1933, originally as an attempt to reduce unemployment, an important movement was initiated for the purpose of improving existing rural housing and replacing insanitary dwellings. A sum of 57·5 million kroner was allocated by the State for the years 1933—1939, about three-quarters of it in the form of subsidies and the balance in the form of public loans. Individual subsidies may amount to 1,000 kroner (since 1939, 2,000 kroner) or a maximum of 80 per cent of the total cost, while loans may amount to 3,000 kroner (since 1938, 3,500 kroner) or to a maximum of 70 per cent of the total cost. Loans bear interest at 4 per cent and redeemable over twenty years. About 68,000 dwellings have been improved or rebuilt during the years 1933—1937 under this scheme. In 1935, Parliament voted special credits to be allocated in the form of mortgage loans to farmers wishing to build or adapt dwellings for their workers. As little use was made of these credits, the conditions were relaxed in 1939. In individual cases, loans may amount to 80 per cent of the cost of the undertaking and will be free of interest for the first half of the period of redemption which is to be twenty years. Subsidies are granted for central heating and water-supply and for the construction of dwellings consisting of more than two rooms and a kitchen. Since 1938, a scheme for assisting large and needy families by enabling them to construct or adapt small one-family houses has been applied to rural areas on the same principles as to urban areas.

APPENDIX No. 32

Diagram of the machinery of administration

Area of jurisdiction. (1)	Revenue. (2)	Magisterial. (3)	Police. (4)	Jails. (5)	Civil judicial. (6)	Registration. (7)	Excise. (8)
Presidency ..	Board of Revenue.	High Court ..	Inspector-General .	Inspector-General ..	High Court ..	Inspector-General ..	Board of Revenue.
Circle	....	....	Deputy Inspector-General.	....	..	....	Deputy Commissioner, Assistant Commissioner.
District	* Collector	* Sessions Judge, District Magistrate.	District Superintendent.	Superintendent, Central Jails	District Judge ..	District Registrar .	Excise Inspector.
Division	Divisional Officer ..	Subdivisional Magistrate.	Assistant or Deputy Superintendent.	....	Sub-Judge, District Munsif.	....	....
Taluk	Tahsildar	Sub-Magistrate ..	Inspector	Superintendent, Sub-Jail.	....	Sub-Registrar ..	Excise Sub-Inspector.
Sub-Taluk	Deputy Tahsildar, Revenue Inspector.	...	Sub-Inspector ..	....	....	....	....
Village	Village Headman, Karnam.	Village Headman, Panchayat Court (some villages).	Talaiyari	....	Village Munsif, Panchayat Court (some villages).	....	....

Area of jurisdiction.	Survey. (9)	Medical. (10)	Public Health. (11)	Education. (12)	Agriculture. (13)	Veterinary. (14)	Co-operative. (15)
Presidency ..	Board of Revenue, Assistant Directors.	Surgeon-General or Principal, Indian Medical School, as the case may be.	Director of Public Health.	Director of Public Instruction.	Director of Agriculture.	Director of Veterinary Services.	Registrar of Co-operative Societies.
Circle	....	....	Assistant Director of Public Health.	Divisional Inspector or Inspectress.	Deputy Director ..	District Veterinary Officer.	Deputy Registrar.
District	....	District Medical Officer.	District Health Officer.	District Educational Officer.	District Agricultural Officer.	....	....
Division	....	....	....	....	....	....	....
Taluk	....	Assistant Surgeon or Sub-Assistant Surgeon.	Health Inspector ..	Deputy Inspector of Schools or Sub-Assistant Inspectress.	Agricultural Demonstrator.	Veterinary Assistant Surgeons.	....
Sub-Taluk	....	....	....	....	....	....	....
Village	....	....	....	....	....	....	Co-operative society (some villages).

* Though the Collector and District Magistrate is entered under Revenue and Magisterial, his functions are not confined to these departments.

Diagram of the machinery of administration—cont.

Area of jurisdiction.	Forests. (16)	Industries. (17)	Labour. (18)	Fisheries. (19)	Public Works. (20)	Electricity. (21)	Marine. (22)	Broadcasting. (23)
Presidency ..	Chief Conservator..	Director of Industries and Commerce (some specialists).	Commissioner of Labour.	Director of Fisheries.	Chief Engineers.	Chief Engineers.	Presidency Port Officer.	The Radio Engineer.
Circle	Conservator ..	....	....	Deputy Directors, Assistant Directors.	Superintending Engineer.	Superintending Engineer.	....	Servicemen.
District	District Forest Officer.	....	Collector ..	Inspector of Fisheries.	....	Divisional Engineer.	....	....
Division	....	....	....	....	Executive Engineer.	Assistant Engineer.	....	....
Taluk	Ranger	....	....	....	Subdivisional Officer.	Junior Engineer or Supervisor.	....	....
Sub-Taluk	....	....	....	....	Supervisor or Overseer.	....	....	....
Village	....	....	....	....	....	....	....	....

N.B.—This table is arranged according to areas of jurisdiction ; it must not be assumed that all officers in the same horizontal line are of equal status or lower status than those in higher horizontal lines in other vertical column.

Appendix No. 33

[Referred to in the Introduction]

[*Synopsis for monographs on rural life problems in India, prepared by the Indian Society of Agricultural Economics*]

Explanatory note

The main object of the preparation of these monographs on Rural Life Conditions is twofold : (i) to get a clear idea of the weakness of our rural life conditions and (ii) to submit to critical examination the various efforts made by the authorities and the people to remove them so that an all-round comprehensive effort is made for an orderly development of the country side.

Indian Rural Life is mostly in a static condition ; it has to be roused into an active dynamic force. To achieve this end, no one measure would be enough. There are certain fundamental conditions for the full development of production. For example, land—the principal source of production— must be owned by the cultivator, and, where that is not possible, he must get a fixity of tenure on an equitable basis. The producer must be educated, specially the backward class holders of land. They all must live in healthy surroundings and homes. The whole administrative machinery should be so devised as to make the producer well organized to take advantage of the Government measures for improvement in the productive capacity of land and the profitable disposal of his produce.

Besides judging the adequacy of the Government efforts and their efficacy, one has always to consider their comparative importance so that deficiencies may be made up in order of urgency. This can only be done when the facts are properly collected and ameliorative measures are intelligently reported.

The synopsis presented here, cannot, by the very nature of the case, be complete in every detail. Indian Rural Sociology is so varied and complex that our outline would need to be supplemented with due regard to local conditions and requirements. Here we have endeavoured to indicate only the general lines of work. When a sufficient number of monographs has been prepared along these lines, it is proposed to call a Conference for the whole of India to consider these Rural Life Problems.

The main objectives of our scheme may be summarised as under * :—

(I) To collect documentary material giving as vivid a picture as possible of the various forms of Rural Life in different parts of India,

(II) To organise between the Indian Provinces and States an exchange of information and ideas in order to mobilise their experience for the benefit of all,

(III) To make known the methods adopted in certain countries -- both Indian and foreign for the definite purpose of improving the standard of rural life and the result achieved through such efforts,

(IV) To ascertain what difficulties stand in the way of similar progress in other parts or regions,

(V) To lay down certain guiding principles applicable *mutatis mutandis* to the rural population in India,

* This is adopted from the League of Nations' Project for a Rural Life Conference for Europe which was to be called in 1939 but had to be abandoned owing to the war.

(VI) To ascertain how the individual efforts of different sections might be supported by appropriate joint action by neighbouring provinces, tracts or States,

(VII) By discussion and example, to encourage the Governments and the general public to take interest in all attempts to improve the conditions of life of the rural population,

(VIII) To obtain technical advice of experts on certain problems of common interest to rural population of the whole of India.

During the time the Provincial, Regional or State documents are under preparation by various agencies, the Indian Society of Agricultural Economics will try to gather material now available in India regarding similar activities in foreign countries, such as the League of Nations publications, the International Institute of Rome Bulletins and the publications of other Governments, such as the United States of America, Great Britain, etc.* These topical monographs on comparative Indian conditions would provide valuable material for forming opinions and policies by various bodies.

The scheme propounded here is ambitious but its fulfilment is not impossible if the Society could enlist the co-operation of all the agencies concerned and interested in this subject, such as, Government Departments, Universities, colleges and other public institutions. The fundamental idea is that the standard of life of the millions of the people of India should be materially raised. This presupposes the fullest mobilization of all the resources and combined efforts of the Central as well as Provincial Governments, the Governments of Indian States and also the public at large. The plan of study and research indicated here as a first step will, it is hoped, yield fruitful results.

* The documents prepared by the various Continental Governments on their Rural Life Problems as also the topical studies published by the International Institute of Agriculture at Rome are very useful for our purpose. They are available at the League of Nations' office at New Delhi.

SYNOPSIS

I

INTRODUCTION

General

General Description of the Territory. Its area. Geographical position. Climate. Geology. Other physical features. Diversity of areas comprising it. Rivers, hills and mountain ranges. Principal towns. Rural and urban areas. Soils and their variety.

Special events of historical importance which have influenced the grouping of territories with descriptive features.

II

INFLUENCE OF DEMOGRAPHY

Population

a. Rural population :—
  (*a*) Land owners.
  (*b*) Tenants.
  (*c*) Labourers, Self labour.
  (*d*) Artisans.
b. Urban Population.
c. Density of population.
d. Health and diseases,
  Birth and death-rates,
  Expectation of life,
  Principal diseases.
e. Occupations : division of population into various occupations.
f. Migration : Immigration and emigration.
g. Composition of rural population by castes and races. Their social status and economic efficiency.

III

LAND TENURE SYSTEMS, LAND SETTLEMENTS, AGRARIAN REFORMS

(*a*) Land tenures in the area. Different systems. Their historic origins and importance. Area under each. Their chief characteristics. Forms of taxation.

(*b*) Holdings of land. Their trends. Transfer of lands from agriculturists to non-cultivators or non-cultivating classes (trend). Lands held by different classes or castes or races of people.

Agrarian Reforms

(*c*) (1) Restrictions on alienations—Their effects.
  (2) Tenure Legislations and their effects.
  (3) Regulation of rent.
  (4) Creation of special tenures or holdings with restrictions on transfer.
  (5) Record of land rights.

(*d*) Fragmentation of holdings. Conditions in the area. Restrictions on fragmentations, if any. Consolidation of holdings. Nature of the measures adopted ; Co-operative, Legislative, and results thereof. Government policy in this connection. Facilities offered for consolidation, if any. Uneconomic holders and their position. Subsidiary occupations.

(e) (1) Irrigation facilities. Area irrigated under various schemes; canals, wells, tanks.

Uses of mechanical power or electricity in the lift irrigation. Tube wells. Possibilities of extension.

(2) The tract's liability to famines, floods or frosts. Protective measures adopted or under consideration. Nature of the help given for the protection of the cultivator from such calamities.

(3) Afforestation and creation of village woodlands.

IV

TECHNICAL IMPROVEMENTS IN AGRICULTURE

Designed to raise the standard of life of the rural population

Local, Regional or National measures—soil improvements—crop improvement measures. Tools and equipment of the cultivators and efforts to replenish or improve the same.

Draught cattle—The breeds and their improvements. Elimination of useless animals.

Principal crops in the area—area under each—Yields—Efficiency—Types of cultivation—Food crops or money crops—Mixed farming—Area under each—Trends. Supply of pure seeds.

Government organization for researches—measures adopted by Government to introduce improvements—Adequacy or usefulness of the measures—Nature of propaganda. Crop diseases and pests—Measures taken to control them. Stray cattle, pigs, nilgai, etc.

V

RURAL INDUSTRIES

(a) Dairy.

Types of cattle—Breeds—Measures taken for their improvements.

Disposal of milk and the other products—efficiency of measures adopted to their disposal.

(b) Poultry farming, bee keeping, sheep raising.

(c) Other industries subsidiary to agriculture. Processing of crops—ginning and baling of cotton, husking of paddy, tanning, cart plying, spinning and weaving, rope making, other arts and crafts.

(d) Veterinary services—Their extent and usefulness—Reporting of epidemics.

VI

MARKETING OF CROPS

How effected.

Marketing legislation—Its effects.

Local markets and their regulation if any—Grading of crops—Warehouse facilities.

Measures taken to maintain prices—Recent trends in the prices of principal farm products of the locality.

Co-operative measures—Government help and direction—Success of measures—Their finance.

Other forms of co-operation—co-operative stores, co-operative stalls, societies, etc.

VII

FINANCE OF AGRICULTURE

(1) The money-lenders and indigenous bankers—extent of their operation—measures taken to control or regulate their business—their effects—measures taken to protect the cultivators in the execution of decrees against them.

(2) Rural indebtedness—measures taken to reduce it. Conciliation proceedings and their results. Their effects on Rural Credit.

(3) Co-operative Credit—its growth and development—The Co-operative spirit: self help and self-reliance. The type of organisation in the primaries and in the banks. Multi-purpose societies.

(4) Land Mortgage Banks—extent of their operations—objects of loans—How far used for effecting improvements in cultivation. Areas under operation—dry or wet. Results.

Crop Insurance.

Cattle Insurance.

Possibilities of the above.

Other forms of co-operation for improvements in agriculture, e.g., Bunding Societies, societies for fencing, cattle breeding, etc.

How far funds are available for Rural Credit.

Rates of interest.

Changes in the method of money-lending as a result of restrictive legislation.

Position of uneconomic holders in the Co-operative movements—measures adopted to help them.

VIII

EDUCATION

General, vocational, adult, domestic, cultural influences, arts, folklore, etc.

(*a*) Primary education—How far spread.

Number of villages served out of a total of............

Percentage of school-going children to population.

Possibility of compulsion considered, if any—if introduced, how far successful.

School and its equipment—Buildings, play-grounds, etc.

Improvements in Primary Education with special reference to needs of rural life.

(*b*) Special schools for backward classes or communities—their characteristics.

(*c*) Adult education.

Literacy movement.

(*d*) Vocational training for village population special schools or special courses provided. The school and its relation with the public. Boy Scout movement—First-aid training. Special training for teachers for rural life.

Cultural forces in village life

Social organization—community life. People's own organisations. Religious life and ceremonials—how they affect economic conditions—Social contacts—Women's life and status—Influence of towns on village life. New habits formed.

IX

HEALTH AND SANITATION, PROBLEMS OF NUTRITION

Village Housing conditions.

Village Housing Regulations.

Housing of Cattle :—Present arrangement ; provision of court yards.

Village sanitation and village sanitary service. Their organization and efficiency ; adequacy.

Co-operation of the people.

Water supply ; adequacy, purity.

Medical relief, maternity relief. Their adequacy. The system under operation.

Nutrition problems. Inquiries made, if any. How far old customs modified—hand-milling, and use of machine polished rice. Introduction of modern machinery in the processing of food crops for domestic use. Restrictions of these machines.

Provision of courtyards and growth of vegetables.

Health organizations in districts, their nature and plans of work. Training of staff. Diseases and their treatment. Malaria, hookworm, T.B., Venereal diseases, etc.

Popular interest in village sanitation. Nature of propaganda to create it.

Rural electricity—Nature of supply—Possibilities.

Control of food products—Adulteration of milk, ghee, etc. Need for regulation, municipal or State. Sanitary Regulations for the rural areas.

X

INDUSTRIAL DEVELOPMENT OF THE AREA

Resources of the territory.

Forest.

Minerals.

Agricultural.

Water power.

How far investigated for their economic values and exploited. Government policy in this connection.

Industries developed—Nature and types. Men employed—Local and outside. Markets for their products. Their dispersion as against concentration in different areas.

How far pressure on land removed by the diversion of population from agriculture to industries, as also by emigration. Influence of these industries.

Financial organization for the development of industries.

XI

ADMINISTRATION

(*a*) Administration of the village panchayats :—

(1) Functions.

Sanitation.

Housing.

Judicial and Revenue. Protection of life and property. Water-supply, supervision over education, etc. Amenities in village life. Village woodlands policy.

(2) Income :—Taxation. Other sources of revenue. Voluntary work by the people. System of Begar or Veth, if any.

(3) Constitution of the Village Panchayat.
Functions now exercised.

(4) Supervision and guidance from—
District Boards,
Revenue Officials,
Special Agencies,
Mahal Panchayats,

(*b*) Influence of administration, specially of the Revenue Department, on the economic life of the people.

Delays in administrative work.

Attitude of the village service to the needs of the rural population.

(*c*) Social legislation that would improve the social and economic life of the people.

(*d*) Policy of the Government for rural reconstruction. Their organization and plans. Their comprehensiveness. Nature of the machinery created. Efficacy of the machinery. Agency, if any, for the study of the social and economic condition of the people. How far carried out.

(*e*) Transport facilities :—
(1) Ports and their developments.
(2) Railways.
(3) Roads :—Trunk and Feeder—Adequacy.

(*f*) Litigation.

(*g*) Co-operation of the people in the rural development. Their own organizations and spirit. Their response to Government efforts. Nature of co-operation. Their contribution in funds to Government Grant-in-aid scheme or otherwise.

(*h*) Rural studies already made by Government. Their nature—How far recommendations are attended to.

Studies by other agencies.

Finance of rural developments under each head. Percentage of total revenue. Adequacy of funds provided and their proper distribution among departments.

Nature of administrative control over various activities. Their co-ordination. How far supported or guided by the public.

XII
CONCLUSION

Summary of the Rural Problems of the area and how far they are being solved. Efficacy of the measures taken. Popular support. The future.